CHAMBERS'S

ENCYCLOPÆDIA

A DICTIONARY

Ð)

UNIVERSAL KNOWLEDGE

NEW EDITION

VOL. V.

PRIDAY TO HUMANITARIANS



WILLIAM & ROBERT CHAMBERS
LONDON AND EDINBURGH
J. B. LIPPINCOTT COMPANY, PHILADELPHIA
1890

All Rights reserved

The following Articles in this Volume are Copyrighted, 1890, by J. B. Lippincott Company in the United States of America: GEORGE, HENRY. HARTE, FRANCIS BRET. Georgia, U.S. HARVARD UNIVERSITY. GRANT, ULYSSES S. HAWTHORNE, NATHANIEL, HARRISON, BENJAMIN. HOLMES, OLIVER WENDELL.

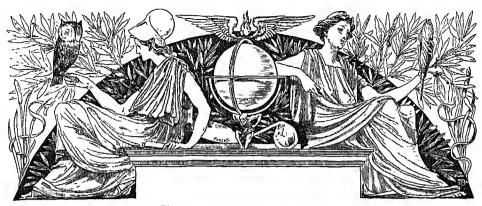
Among the more important articles in this Volume are the following:

	EDITORIAL SOURCES	Rev. J. FROME WILKINSON.	(HUN	W W Guleria
	FRIENDS			Lieut, Colonel Dunior, R.A.
		Professor Parmer Geodes.	CHARLES SA	Major-General Ausurnnor.
	,			
	FUEL		GUNPOWDER PLOT	
		Rev. Wistworth Websier.		Dr Charles W. Cameart.
1	FUR9		GYPSIES	
	G; H	Canon Islan Taylor		Professor Carona, G. Knott.
	GARLIU	Professor Mackinnon.		Dr J. Collingwood Batter.
	(4AINSBOROUGH	J. M. GRAY.	IIAF12	W. A. Chouston.
	GALLAND; GALLEY	STANLEY LANG-POOLE.	HAIR	Professor D. J. Cunningham
	GAMBETTA; GREY		HAIR MANUFACTURES.	ALEXANDER GALLERLY,
ì	CARDENING		HALL MARKS	G. E. Gra.
	GARIBALDI		HALLAM	
	GARRICK		HALLUCINATIONS	
ŀ			HALOS	
	GAS; GAS-LIGHTING			
ŀ	GAS-ENGINE		HAND; HIP-JOINT	
	GAY; GOLDSMITH	Долия Воняби.	HANDEL	
ı	Сеоскаринель D18-		HANNIBAL; HAZEFF,.	
ŀ	TRIBUTION	G. G. Chisholai	HARBOUR	D. & T. STEVLISON.
l	CECOGRAPHY,	John S. Kriste, P.R.G.S.	HARMONY	FRANKLIN PLEURSON,
ĺ	GEOLOGY	Professor JAMES GERRIE.	HARRISON, BENJAMIN	General Law Wyladare,
ı	GEOMETRY		HASTINGS, WARREN	II. O. Keene, C.1 B.
ì	George I. IV			C. P. Lucys, Colonial Office.
ŀ	GEORGE, HENRY			Grorer Parsons Lathror.
l			HAYDN	
ı	GEORGIA, U.S			•
l	GEORGIA		Havri	
ı	GERMANY	Pinday Muridada	HEAT	
ı	GIBBON; FULLER	THOMAS DAVIDSON,		Rev. Professor A. B. Dayidson.
	GIBBONS, ORLANDO	Sir George Grove,	Hegel	
ı	GLACIAL PERIOD	Professor dames General	HEINE; HOFFMANN	J. T. Bealdy.
ı	GLACIERS; GEYSERS	John Gunn,	Hemans, Mrs	ROBLET COCHRANG.
ŀ	GLADSTONE, W. E		HENRY I, VII	W. DUNDAS WALKER.
	GLANDERS		HENRY VIII	
	Grasgow	•	HERALDRY	
ŀ		i i	Herat	
	CLASS			John Herry Shorthouse.
l	GLASS-STAINING	WILLIAM MORRIS.		
	GNOSTIOS		HEREDITY	
	GODWINS; HOOK		HERODOTUS	
ı		Professor Edward Dowden.	HEYWOOD	
l	Gotto	C. C. W. Lock.	IIIBERNATION	Dr Robert Brown.
ı		CHARLES E. S. CHAMBERS.	HIEROGLYPHICS	E. A. Wallis Burger
		Colonel Sir W. F. Burnga,	HIGHLANDS	DUKE OF ARGYLL
ŀ	GORILLA		HILL FORTS	Dr Joseph Anderson,
	Cloubers	Rev. J. Sufficiend Beack.	HIPPOCRATES	
ĺ			HITTITES	
	GOTHIU AROHITECTURE		Hobbes	
	Gorns		HOGARTH	
	GOVERNMENT			
l	GOWRIE CONSPIRACY		Horbets	
ı	GRAIL, HOLY	Alfred Nutr.	HOLLAND	
	GRAMMAR	Dr John Pelle.	Holothurians	W. E. HOYLE.
ı	GRANT, ULYSSES S	General James Grant Wilson.	HOLMES; BRET HARTE	Dr F. H. Underwood,
l	GRAVITATION	Professor A. C. Merchell.	HOMER	Right Hon. W. E. GLADSTONE, M.P.
	GREAT BRITAIN-		HOMEOPATHY	Dr A, C. Popp.
		Professor James Geikie	Ноор	Canon Aineer.
ì	Climate	. 1	HOOKER; HALES	
l			HORACE	
ļ	Statistics	The state of the s		
	CHRECE,			H. M. FRODSHAM; J. R. PAHMAN.
	GREEK ARUHITKOTURE.		Horse	
		His Exactlency Joannes Gennadios.		W. C. A. Blew, of the Field.
	GREENLAND	Dr Hunry Ring.	Hospitals	
	GROTE	G. Barnett Smith.	Howe, John	Rey. James Inglis.
	GUILDS		Hugo, Viotor	W. E. HENLEY,
	GUIZOT; HAMPDEN		HUGUENOTS	
	GULF STREAM		HULL	
	The Publishers beg	to tender their thanks, for revis	sing the article 'Fungi,'	to Mr GRORGE MURRAY; for
	C CALL 1 CA 13 1 1 13	TT 37 P (C) 11 1	RI. Clauses B. (/) !!.	I de The-Fearer Cleaner Diam's

The Publishers beg to tender their thanks, for revising the article 'Fungi,' to Mr George Murray; for 'Girton College,' to the Vice-Mistress; for 'Gray,' to Mr Gosse; for 'Grégoire,' to Professor Caspar Réné Gregory; for 'Green (J. R.),' to Mrs Green; for 'Greenock,' to Ex-Provost Campbell, for 'Harrow,' to the Rev. J. C. Welldon; for 'Heredity,' to Francis Galton, Esq.; for 'Hereford,' to the Hon, and Very Rev. Dean Herberr; for 'Hobbes,' to Professor Croom Robertson; for 'Howard,' to Walter Rye, Esq.; for 'Huddersfield,' to Mr G. B. Nalder, Town-clerk.

MAPS FOR VOL. V.

PAGE
GERMANY
GREAT BRITAINGEOLOGICAL
Physical
GREECE, ANCIENT384
HOLLAND



CHAMBERS'S

ENCYCLOPÆDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE





Vendredi, Ger. Freitag, Swed.
Fredag), the sixth day of the week, takes its name from the goddess Frigga, the wife of Odin, to whom it was consecrated. The word is, however, often connected with Freyja, the goddess of love, to which notion the Latin name is due. As the day of the week on which the Crucifixion of our Lord took place, it has had a special sanctity among most

week on which the Crucilizion of our Lord took place, it has had a special sanctity among most Christian peoples, and Roman Cathelies still hold it as a weekly fast. The Friday in Holy Week is the day on which the Passion is especially celebrated, and as such is the most solemn of the festivals of the Christian church. Almost everywhere within the range of Christendom, Friday is a day of proverbial in-luck, on which it is not wise to put to see the mostry or commence any importto put to sea, to marry, or commence any important undertaking. In some places other days are unlucky for particular enterprises, but Friday holds its character everywhere and for undertakings of all kinds. Among no class of men is this notion more possistent than among mariners, who, whether Eventicky Lighter Executive Eliung Executive Eliung of English Spaniards, Italians, Bretons, Finns, or Englishmen, aliko manifest the same disinclination to put to sea that day; and recount many a story of disaster that has followed some too greatly daring disaster that has followed some too greatly daring crew, the memory unconsciously retaining the few confirming cases, while the many exceptions are easily forgotten. A persistent but not localised tradition in both England and America tells of a ship, the keel of which was laid on Friday, that was launched on Friday, with the name of Friday, and sent to sea on Friday, under a Captain Friday, but which deservedly was never heard of again. Shipping statistics still show a smaller number of sailings upon that than upon any other day—it may be well for sailors to be reminded that Columbus both sailed and discovered land on Friday, and that both sailed and discovered land on Friday, and that the Pilgrim Fathers touched land on the same day. 209

Although the Russian name for Friday, Pyatnitsa (pyat, 'five'), has not a similar mythological significance with Friday or Vendredi, the day was conscerated by the ancient Slavonians to some goddess similar to Venus or Freyja. Afanasiof explains the Carinthian name Sibne dan as indicating that it was once hely to Siva, the Lithuanian Seewa, the Slavonic deity corresponding to Ceres. In Christian time the deity presiding over Friday became merged in St Prascovia, and is now addressed under the compound name of 'Mother Pyatnitsa-Prascovia.' She wanders about the house on her holy day, and is displeased to see sewing, spinning, woaving, and the like going on, revenging herself by plagues of sore cyes, whitlows, and agnails. Especially must the house be clean of dust on the Thursday evening, so that she may not be offended Although the Russian name for Friday, Pyatnitsa Thursday evening, so that she may not be offended on her visit the next day.

Frideswide, Sr, the pationess of Oxford, was born there early in the 8th century, the daughter of Dida, an ealderman. She preferred the religious life to marriage with Algar, a great Mercian noble, who, coming in search of her, was struck blind. She died on 14th November at Oxford (q.v.), and was formally canonised in 1481. Catherine, Peter Martyr's wife, was haried beside her pillaged shrine in 1552, exhumed by Cardinal Pole, but reinterred there in 1561, when the remains of the virgin saint and of the ex-nun were in of the virgin saint and of the ex-nun were in-dissolubly mingled together. See F. Goldie, S.J., The Story of St Frideswide (1881).

Friedensville, a small post-village of Lehigh county, Pennsylvania, 6 miles SE of Allentown, with a rich zine mine and a famous pump, that raises nearly 30,000,000 gallons of water daily.

Friedland, a town of East Prussia, on the Alle, 26 miles SE, of Königsberg, with 3182 inhabitants. It is faunous as the scene of Napoleon's victory, on 14th June 1807, over the Russian and Prussian forces under Bennigsen, which brought about the Treaty of Tilsit.—FRIEDLAND is also the name of a town in the north-east of Mecklenburg,

with 5502 inhabitants, and of a manufacturing town in the north of Bohemia, on the Wittig, 16 miles N. of Reichenberg by rail, with a pop. of 4317. The last gave name to the duchy from which Wallenstein (q.v.) took his title of Duke of Friedland.

Friedland, Valentin, a remarkable educationist, generally called Trotzondorf, from his birthplace, near Görlitz, in Prussian Silesia, was born 14th February 1490. At Leipzig he stadied Latin under Peter Mosellanus and Greek under Richard Croeus, and he began his career as a teacher in the school at Görlitz. Ou the dawn of the Reformation he proceeded to Wittenberg, and studied under Luther and Melanchthon. Settling at Goldberg, in Silesia, as rector of the gymnasium there in 1531, Friedland introduced into his school a novol system of instruction and of discipline, which soon spread the fame of the institution through all the adjoining countries of Europe. The principal feature of the disciplinary system was that the preservation of order and decornin was left in the hands of the boys themselves. Instruction was imparted through the medium of academic discussions, coupled with frequent repetitions and examinations. Friedland died, 26th April 1556, at Liegnitz, whither he had removed his school two years before. See the biographics by Herrmann (1721), Frésch (1818), Pinzger (1825), Köhler (1848), and Löschko (1856).

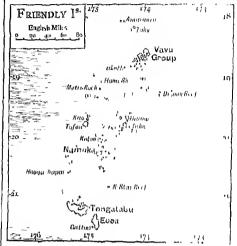
Friedrich. JOHANN, a Catholic theologian, a leader with Döllinger in the Old Catholic movement. Born in Franconia in 1836, he became a professor of Theology at Munich in 1865; assisted at the Vatican Council in 1870; and subsequently, in life and labours, has been identified with the Old Catholics (q.v.).

Friedrichroda, a town of Thuringen in the charming Schilfwasser valley, 13 miles SW. of Gotha by rail, is a favourite summer resort, receiving some 7000 visitors yearly. Here is the Duke of Gotha's heautiful country seat, Reinhardsbrunn, on the site of the old abbey of that name, destroyed in the Peasant War. The town has bleaching establishments and large laundries, supplied from Magdeburg, Berlin, Hamburg, &c. Pop. 3146.

Friedrichsdorf, a town in the Prussian province of Hesse Nassau, on the southern slope of the Tannus, 3 miles NE. of Homburg. It was founded in 1687 by thirty-two Inquenot families, and its 1189 inhabitants still speak French.

Friendly Islands, or Tonga Group, lie 250 miles ESE. of Fiji (q.v.), number 32 inhabited and about 150 small islands, and consist of three sub-groups, with a collective area of only 385 sq. m. Tonga-tabu (130 sq. m.) is the largest; and next in importance are Eooa, Vavu, Namuka and Lefuka, Tofoa, Late, and Kao. The great majority are of coral formation; but some are volcanic; there are several active volcanoes, such as Tofoa (2781 feet) and Late (1787); and earthquakes are frequent. During a severe volcanic disturbance in October 1855 a small island 20 miles north-west of Honga Hapai was upheaved, and named Sandfiy Island, after the government schooner which first visited it. A treaty was concluded with Germany in 1876, with Great Britain in 1879; and the convention signed at Berlin in 1886, defining the British and German possessions in the Western Pacific, provides for the neutrality of this archipelago. The Friendly Islands were discovered by Tasman in 1643, but received their collective name from Cook, who visited them in 1777. Both these navigators found the soil closely and highly caltivated, and the people apparently unprovided with arms. The climate is salubrious, but humid; hurricanes are frequent. Among the products of the islands are tropical fruits, copra, coffee, sponges,

cocoa-nuts, and arrowroot. The imports in 1888 amounted to £48,730, and the exparts to £66,473. The flora resembles that of the Fiji group; but the native animals are very few. In the south part of Tonga-tabu there is an ancient monument of two



perpendicular rectangular blocks of stone about 40 feet high, with a slab across the top, and thereon a stone bowl. The stones must have been brought

by sea.

The Friendly Islands were first visited by missionaries in 1707. In 1827 the work of evengelisation fell into the hands of the Wesleyau Methodists, and, after a lengthened and perilons stringgle with the savage paganism of the inhabitants, it was growned with success. Almost all the islanders (who, unlike the Fijians, belong to the fair Polynesian stock) are now Christians; many can speak English, and schools are numerous. In mental development, skill in house-building, and in the preparation of weapons, dress, &c., they are superior to other South Sea islanders. They are superior to other South Sea islanders, over each lowever, decreasing in numbers; once estimated at 40,000 or 56,000, they had dwindted to 22,937 in 1884. The various islands used to be governed by independent chiefs, but in 1845 they were brought under the rule of one chief, called King George, an able ruler, and a zealous preacher of the gospol. In 1862 he gave the islands a constitution, and summoned a parliament of forty members. See H. S. Cooper's Caral Islands (1880).

Friendly Societies. The prototype of the modern friendly society has been found in the medieval trade or erait guilds; and there is some connection between the older specimens of the village benefit club and these guilds, which were the friendly societies of their day. During the nonage of Edward VI, the eraft guilds were disestablished and disendowed (their revenues becoming the prey of greaty courtiers); but there are traces in some rural districts of Enghand (but the convivial, if not the beneficial, aspect of the old guilds survives in the annual feast of the village club. The gorm, however, of the present system of mutual provident associations under the friendly society form is contained in Defoc's Essays on Several Projects (1606), in which the author of Robinson Grusse advocated the promotion of 'societies formed by mutual assuvance for the relief of the members in seasons of distress. . by which not a creature so miserable or so poor but should claim subsistence as their due, not ask it of charity.' Indeed, it would seem as though Defoe was only seeking to extend the operations of

a species of thrift institution already in existence, since we find a London society founded in 1687 among the dozen known survivors of henefit clubs established during the last quarter of the 17th and the first half of the 18th century. The Ancient Order of Free Gardeners is of considerable antiquity in Scotland, the oldest known lodge being that of Dunformline, the charter of which dates from 1715.

This form of provident insurance is peculiar to the English-speaking race, and is the invention of the industrial classes of Great Britain, as the means whereby they have supplied their economic needs for themselves by themselves, 'no man showing them the way, not by prescription of law, not by influence of superiors.' In 1703 the legislation influence of superiors. In 1793 the legislation first recognised the expediency of protecting and encouraging friendly societies, and enacted 'that it should be lawful for any number of persons in Great Britain to form themselves into and to establish one or more modely or persons. establish one or more society or societies of good fellowship, for the purpose of raising from time to time, by subscriptions of the several members, a stock or fund for the mutual relief and mainten-ance of all and every the members thereof, in ald age, sickness, and infirmity, or for the relief of the widows and children of deceased members' (Rose Act). And a parliamentary committee of 1825 excellently gives the raison d'erro of the mutual friendly society as compared with the individualistic savings-bank: Whenever there is a contingency, the chequest way of providing against it is by milting with others, so that each man may subject himself to a small deprivation, in order that no man may be subjected to a great loss. He upon whom the contingency does not fall does not get his money back again, nor does he get for it any tables money back again, nor does he get for it any visible or tangible benefit; but he obtains security against rain, and consequent peace of mind. He upon whom the contingency does fall gets all that those whom fortune has exempted from it have lost in hard money, and is thus enabled to sustain an event which would otherwise overwhelm bim. The individual depositor, not the contributor to a common fund, is really the speculator. If no sickness attacks him during his years of strength and activity, and he dies before he is past labour, he has been successful in his speculation; but if he fall sick at an early period, or if he live to old age, he is a great loser, for his savings, with their accumulations, will support him but a short time in sickness.' What the Rose Act of 1793 was to societies that existed in the last decade of the 18th century the enabling emetment of 1829 (10 Geo. IV. chap. 56) was to societies which helonged to a more developed period of history. Much of the elliciency and good working of this act was due to the new departure taken by its sponsor, Lord Portman, then M. P. for Dorsetshire, in putting himself into communication with representatives of those bodies for which he purposed to legislate. The Act of 1829 forms the transition from the system of local to that of central registration, and the supplementary Act of 1834 carried control isation a step further. Prior to the date of the former act a provincial system of registration and returns prevailed, each clerk of the peace holding the office of registrar for his several county, the rules being certified and the scales of contributions passed by the county magistrates. But henceforth three registrars of co-ordinate authority for England, Scotland, and Ircland were appointed. The provision requiring justices to be satisfied that the tables of contributions and benefits might be 'adopted with safety to all parties concerned' was repealed; but, in view of existing imperfect and inefficient data in the matter of vital statistics, societies were under the obligation of making quinquennial returns of their sickness and mortality experience. The following privileges of the Act of 1793 were confirmed: power to recover funds from defaulting officers by summary proceedings; priority of claims for moneys on the assets of any deceased or hankrupt officer or trustee; power to determine disputes by arbitration, and of instees to enforce compliance with the ruling of the arbitrators; exemption of stamp duty on bonds.

The Victorian era was contemporaneous with the financial period in the history of the friendly society system. Hitherto societies had been rather benevolent than benefit, more convivial than linancial, in their status. But with Mr Charles Ausell came the dawn of actuarial light on the friendly society world. The purely scientific principles hid down by Mr Ausell were recitified and extended by Mr Neison the elder, in his magnum opus, Contribu-tions to Vital Statistics (1845). Five years later appeared Observations on the Rate of Mortality and Sickness amongst Friendly Societies, &c., with a series of tables showing the rulne of annuities, sick gifts, assurance for death, and contributions to be paid aquivalent thereto, calculated from the experience of the Manchester Unity of Oddfellows, by Henry Ratchillo, corresponding secretary. The outcome was the famous 'Ratchille Tables,' subsequently corrected by the compiler, and entorsed by the Royal Commission of 1871-74 as the soundest and most reliable tables extant. Thus twenty-live years prior to the Friendly Societies Act of 1875 (which embodied the recommendations of the commissioners), making a valuation of assets and liabilities compulsory, the late secretary and actuary of the Manchester Unity laid down the actmay of the Manchester Unity hald down the true principles of financial security, and prepared the way for a process of self-reform in the society which it would be difficult to match in the history of any other public and corporate body. The classification of the various trades of members accupied Mr Ratchille from 15 to 17 hours per day, and 1,321,648 years of life were brought under observation. It was not until 1850 that the allifiated class of friendly society received legal recognition under a temporary act, which became, five years later, a permanent measure (18 and 19 five years later, a permanent measure (18 and 19 Vict. chap. 63). Prior to this date they had been illegal combinations, coming under the clauses of the Corresponding Societies Act (39 Geo. 111, chap. 79) and of the Seditions Meetings Act (57 Geo. 111. chap. 19). The legal recognition was, however, of little use to the ufiliated societies, since the then newly-appointed registrar, Mr J. Tidd Pratt, in opposition to the spirit as well as the wording of the act, refused to allow the registration of branches of the orders, except as separate and isolated societies -a misraling which was not corrected, so far as branches registered under this act and not registered under the Act of 1875 were concerned, till 1886 (Supreme Court of Appeal; Scholfield and others v. Vause and others). The only other alterations of importance were the requirement of an actuarial cartificate in the case of societies granting an annity or supermunation benefit, and the abolition of all fees for registry. The Act of 1855 failing to bring about the beneficial results hoped for by its promoters, in 1871 a Royal Commission of Inquiry was appointed, with Sir Stafford Northcote (the late Lord Iddesleigh) for chairman and J. M. Ludlow, Esq., secretary. The labours of the Commissioners extended over a period of four years, and the recommendations of their final report (1874) were embodied in the act now in force (38 and 39 Viet. chap. 60), which, owing to the above mentioned ruling of Mr J. Tidd Pratt, had to be supplemented by a short Amendment Act (1876), under which societies with branches (i.e. affiliated orders) could be registered as such. The following are among the principal alterations effected by the Acts of

1875-76: one chief registrar and three assistants. instead of three separate registrars for England, Scotland, and Ireland with co-ordinate authority; special clause (30) dealing with collecting societies; deposit of rules by unregistered societics no longer allowed; annual audits required; valuation of assets and liabilities required every five years; public auditors and valuers to be appointed by the treasury, but their employment not compulsory; the number of members who can apply to the registrar for an award of dissolution reduced; registrar for an award of dissolution reduced; furthe powers given to the registrar on this point. Alterations in friendly society law subsequent to 1876 have been unimportant, and generally introduced to declare the true meaning of source clause in the Act of 1875. Note, however, should be made of 50 and 51 Vict. chap. 56, which empowers invenile societies and branches to retain memberative the contraction of the contraction o ship till the age of twenty-one years, the former limit being sixteen years. Societies and branches consisting wholly of members between three and twenty-one years of age may be registered, pro-vided (1) they are in connection with some adult society registered under the act, or a branch of any such society, or (2) in connection with some institution or school.

Owing to technical legal difficulties, the registry office is unable to supply accurate information as to the present numerical and financial strength of the friendly society position; but the writer, fram returns specially made to him, is in a position to give the following estimate (which will be found approximately correct) of the principal types of society, registered and unregistered:

	No. of Members.	Funds.
(1) Affiliated Societies	2,024,000	£13,103,000
(2) General with County Societies (3) Peculiar Trade Societies—	300,000	1,500,000
(a) Railway Group (b) Miners' Permanent		144,000
Relief Funds	280,000	253,000
Dividing Cinhs	.1 000 000	2,000,000
LD L COMPRESSION MODIATION	9 600 000	2,230,000
		2,200,000
(7) Juvenile Societies	200,000	190,000
Total	7,411,000	£10,470,000

(1) The affiliated societies are broadly dis-(1) The amnated societies are promity distinguished from their competitors for public favour by being before all things 'friendly' fraternities, in which the social element is the meter of action—sick and luvial clubs, and something more. Long ago this type of society crossed the seas and accompanied the approach to his year begins it developed. panied the enigrant to his new home in 'Greater Britain.' In constitution and government the In constitution and government the Britain.' In constitution and government the orders, as they are termed, are pure democracies. First comes the individual branch—lodge, court, tent, or senate—possessing an independence of management (subject only to general law), and retaining its own sick fund. Then succeeds the district (the limbs, as it were, of the body), a local gathering of branches within a certain given area, in which the funeral allowance is reinspred. area, in which the funeral allowance is reinsured; area, in which the funeral allowance is reinsured; and, lastly, the central body itself, called by some distinctive name (as Annual Movable Committee, High Coart Meeting), an annually or biennially elected parliament of delegates, carrying out its rules and regulations through a working executive. The far and away largest bodies are the Oldfellows (Manchester Unity) and the Aprical Course of (Manchester Unity) and the Ancient Order of Foresters, appropriating between them 1,313,721 members out of the grand total for the class and £10,495,000 of the funds. Other important orders are United Order of Oddfellows (150,806), Temperance Order of Rechabites (75,000), Ashton Unity of

purely local class to meet the altered needs of the day. The class consists of societies of divers degrees of merit, but all possessing a common central fund. The giant among them is the Hearts. of Oak (London), with its 115,284 members and capital of close on one million sterling. The county societies are the 'old established houses' belonging to the 'patronised' group, and are being deserted for the better known of the orders. (3) This class is specially devoted to insurunce against the fatal and non-intal accidents of hazardous occupations, and is of interest as being largely used by working to contract themselves out of the Employers' Liability Act (1880). There has been a recent development of peculiar trade societies, and certain of the professions have established and certain of the professions have established benefit institutions—o.g. Medical Sickness and Annuity, and Clergy Friendly Societies, the former passessing a membership of over 1000 and finals to the value of nearly £25,000. (4) Local societies are fast disappearing before the onward march of a better class of mutual provident association. But the low type of friendly society which periodically divides its funds, and is always beginning afresh to run in the thrift race, is sadly too prevalent; the increasing liability to sickness with advancing years is altogether ignored; a blind eye is turned on the future. (5) Sociotics which gather in their weekly or formightly pence by means of collectors calling from door to door. The bulk of member-ship is composed of the most necessitions poor, and probably two-thirds are women or children. No benefit beyond an insurance at death is given. The actual number of societies forming the class is a small one compared with the total number; for England only 47 out of about 24,000 different hodies Engiand only 27 one of about 24,000 unforms means registered as societies or branches; in Scotland 5 out of 900; in Ireland none out of some 400. The largest societies are the Royal Liver (1,211,250) and the Liverpeol Victoria Legal (1,003,787). The expenses of management, with commissions, range from 20 to 52 per cent, of the annual premiums. The numerical increase of the class is only surpassed by that of the Industrial Assurance Companies. Societies of women are but nearly represented in the voluntary thrift army, and the few that exist the voluntary thrift army, and the rew that exist were mostly established in an indimancial age. An order which aims to be national in its area of membership was, however, established in 1885 by a clergyman of the Church of England (Rev. J. Freme Wilkinson), which has already opened branches in several counties (one in Scothand), and should meet the ever-increasing economic needs of women. The society is registered as the United Sisters' Friendly Society (Suffolk I'nity). (7) Juvenile societies are the thrift 'museries' of the adult societies, and are mostly confined to the affiliated days. the leavest such as the leavest the societies. ated class, the largest number of branches being in

ated class, the largest number of branches being in connection with the Foresters, Manchester Unity, and Rechabites. There is a steady increase in the popularity of juvenile friendly society membership.

Tests of Financial Security and Gand Management.—Registration, 'not because registry of itself can make any society safe, but because its position must be always unsafe without registry.' Rules of contribution for benefits both sick and funeral contribution for benefits, both sick and funeral, on a graduated or shilling scale, according to age on entry, which rates themselves shall be held by actuarial authority sufficient to enery benefits contraded for Record of various properties. tracted for. Record of yearly sickness and mortality experience kept, so that the valuer may be in tality experience kept, so once one realizable possession of sufficient data by which to estimate possession of sufficient data by which to estimate the cooledn's or branches' liabilities. Yearly audit the society's or branches' liabilities. Yearly audit and five-yearly fluancial overhant or ufficient value ance Order of Rechabites (75,000), Asition Omity of Shepherds—the strongest order in Scotland— (71,000), and Order of Druids (58,216). The average cost of management is 7 per cent. of the annual contributions. (2) Is a development of the The several insurance funds kept separate, and

expenses of management provided for. Sick benefits insured till sixty-five, at which age a pension or deferred annuity shall commence, and continue for remainder of life. Reserve funds to realise a clear percentage of interest, equal to that on which tables or scales of contributions have been calculated, generally 3 per cent. Candidates refused who cannot 'pass' the doctor, or who have exceeded in years the maximum limit of forty-five, forty being preferred. Efficient supervision of sick payments to guard against 'malingering' or fictitions claims. Society not to be of local isolated type, dependent solely on its own resources, but associated with other branches of one and the same organisation, or of the centralised type. Means to be taken, in seasons of distress or loss of work, wherehy mombership may be retained. Provision, if desired, for juveniles, widows, orphans, and

decayed members. We would strongly endorse the subjoined authoritative warning: 'A word of caution may be added against furning too hasty conclusions adverse to friendly societies, if it should turn out that the valuations in many cases show an estimated deficiency in the funds to meet the liabilities. It would be strange if it were otherwise, when for the first time scientific tests are applied to contracts that have been in operation without a scientific basis for a long series of years. It must be borne in mind, however, that nothing is more elastic than the contract made by nothing is more classic than the editivate made by a friendly society with its members; no error more easy of remedy, if found out in time, than one existing in the original terms of such a contract. Hence the words "insulvency," "rottenness," and the like, which we sometimes hear freely used as describing the general condition of friendly societies, are utterly out of place. Of friendly societies in general it may be said that, as there are no associa-tions the hencits of which are more important to their members, so there are none that are managed with greater rectitude, and few with equal success,—Introduction to W. Tidd Pratt's Law of Friendly Societies (1881), by E. W. Brahrook, F.S.A.

Societies (1881), by E. W. Brahrook, F.S. A.

For further information, the following authorities may
be consulted: Dr Baernreither's English Associations of
Working Men (Lond. 1889); Wilkinson's Friendly
Society Movement (Lond. 1886); Year Book of Friendly
Societies Registry Office; Annual Reports of Chief
Registrar. Also Ratolifie's Experience of the Annehester
Unity; Mr Francis G. P. Neison's Foresters' Experience;
and the same eminent actuary's Observations on the
Efficient Valuation of Friendly Societies.

Friends, Society of, the designation proper of a sect of Christians, better known as Quakers. Their founder in 1648-66 was George Fox (q.v.). In spite of severe and cruel persecutions, the Society of Friends succeeded in establishing themselves both in England and America. They have, indeed, never been numerically powerful (having at no time exceeded 200,000 members); but the purity of life which from the beginning has so honourably distinguished them as a class has unquestionably exercised a salutary influence on the public at large; while in respect of certain great questions affecting the interests of mankind, such as wear and slavery, they have, beyond all doubt, originated opinions and tendencies which, whether sound or erroneous, are no longor confined to themselves, but have widely leavened the mind of Christendom. Eminent Friends have been George Fox, Robert Barelay, Thomas Ellwood, William Penn, Elizabeth Fry, J. J. Gurney, Bernard Barton, John Bright, &c.; an unfriendly 'Friend was George Robins, who revolutional throat of Gyment of M. We confine our tionised the art of Gunnery (q, v.). We confine our-selves to a brief notice of their doctrine, practice, and discipline, as laid down in their own publications. (1) Doctrine.—It is perhaps more in the spirit than

in the letter of their faith that the Society of Friends differ from other orthodox Christians. They themselves assert their belief in the great fundamental facts of Christianity, and even in the substantial identity of most of the doctrinal opinions which they hold with those of other evangelical denominations. The Epistle addressed by George Fox and other Priends to the governor of Barbadoes in 1673 contains a confession of faith not differing unterfully from the so-called Apostles Creed, except that it is more copicusly worded and dwells with great diffuseness on the internal work of Christ. The Declaration of Christian Doctrine put forth on behalf of the Society in 1003 expresses a belief in what is usually termed the Prinity, in the atonement made by Christ for sin, in the resurrection from the dead, and in the doctrine of a final and eternal indement; and the Declaratory Minute of the yearly meeting in 1829 asserts the inspiration and divine authority of the Old and New Testament, the depravity of human and New Testament, the depravity of minimal nature consequent on the fall of Adam, and other characteristic doctrines of Christian orthodoxy, adding: 'One religious Society, from its earliest establishment to the present day, has received these most important doctrines of Holy Scripture in their plain and obvious acceptation.' It is nevertheless certain that uniformity of theological minimal correct by along for the Unimply and oninion cannot be claimed for the Friends, any more than for other hodies of Christians. As early as 1668 William Penn and George Whitehead held a public discussion with a elergyman of the English Church, named Vincent, in which they maintained that the doctrine of a tri-personal God, manutament that the doctrine of a thi-personal cod, as held by that church, was not found in the Scriptures, though in what form they accepted the doctrine themselves does not appear; and some time later Penn published a work himself, entitled the Sandy Foundation Shaken, in which, among other things, he endeavoured to show that the doctrines of vicarious atonement and of imputed doctrines of vicarious atonement and of imputed dation. But in general the Society of Friends, in the expression of their belief, have avoided the technical phraseology of other Christian churches, restricting themselves with commondable modesty to the words of Scripture itself, as far as that is possible, and avoiding, in particular, the knotty points of Calvinistic divinity (see Barelay's Catechism and Confession of Faith, published in 1673, where the answers to the questions—to avoid theorems. dogmatism—are taken from the Bible This habit of allowing to each individual the full freedom of the Scriptures has, of course, rendered it all the more difficult to ascertain to what extent individual minds, among the Society, what extent individual minds, among the Sceiety, may have differed in their mode of apprehending and dogmatically explaining the facts of Christianity. Their principal distinguishing doctrine is that of the 'Light of Christ in man,' on which many of their outward peculiarities, as a religious body, are grounded. The doctrine of the internal light is founded on the view of Christ given by St John, who, in the first chapter of his gospel, describes Christ—the Eternal Logos—as the 'life' and 'light of men,' 'the true light,' 'the light that lighteth overy man that cometh into the world,' &c. Barclay taught that even the heathen were illumined by this light, though they might not know—as, indeed, those who lived before Christ could not know—the historical Jesus in whom Christians believe. In their case Christ was the light shining in darkness, though the darkness comprehended it not. The existence of 'natural virtue' (as orthodox theologians term it) among the heathen was donied by Barclay, who regarded the heathen was denied by Barclay, who regarded all such virtue as Christian in its essence, and as proceeding from the light of Christ shining through

the darkness of pagan superstition. These opinions would seem to be somewhat freer than those exwould seem to be somewhat freer than those expressed in the General Epistle of the Society published in 1836, wherein they refuse to acknowledge 'any principle of spiritual light, life, or holiness inherent by nature in the mind of man,' and again assert that they 'believe in no principle whatsoever of spiritual light, life, or holiness, except the influence of the Holy Spirit of God bestowed on marking in versus measures and degrees through mankind in various measures and degrees through Jesus Christ our Lord.' But, on the other hand, in Jesus Christ our Lord.' But, on the other hand, in a little treatise published by the Society in 1861 it is affirmed that 'the Holy Spirit has always been afforded in various measures to mankind;' while stress is also laid on the statement of St Paul, that 'the grace of God (understood by Friends to district the investor of the Timing Christ') that signify the 'operation of the Divine Spirit') that bringeth salvation hath appeared to all men.' And another exponent of their views, Mr T. Evans, of Philadelphia, states that 'God hath granted to all men, of whatseever nation or country, a day or time of visitation, during which it is possible for them to partake of the benefits of Christ's death, and be saved. For this end he hath communicated to every man a measure of the light of his own Son, a measure of grace or the Holy Spirit, by which he invites, calls, exhorts, and strives with every man, in order to save him; which light or grace, as it is received, and not resisted, works the salvation of all, even of those who are ignorant of Adam's fall, and of the death and sufferings of Christ, both by bringing them to a sense of their own misery, and to be sharers in the sufferings of Christ inwardly, and by making them purtakers of his resurrection, in becoming holy, pure, and righteons, and recovered out of their sins. Hence it may be safely asserted that they hold a broader (or, as others would say, a more latitudinarian) view of the Spirit's working than any other Christian church or society. In America, about the year 1827, Elias Hicks, a Friend of very remarkable powers, created a schism in the Society, by the promulgation of opinions denying the miraculous conception, divinity, and atonement of Christ, and also the authenticity and divine authority of the About one half of the Society in Holy Scriptures. America adopted the views of Hicks, and are known as Hicksite Friends; their opinions, of course, are repudiated by the rest of the Society, who may be described as Orthodox Friends. The Hicksite schism thoroughly alarmed the latter, both in England and America, and a movement was hegun in favour of education, of a doctrinal belief more nearly allied to that of the so-called 'Evangelical' party, and of a relaxation in the formality and discipline of the Society. The leader of this movement was Joseph John Gurney, of Norwich. This new tendency, however, excited considerable opposition. sition among some of the Friends in America; and the consequence was a division among the Orthodox Friends themselves, and the formation of a now sect, called 'Wilburites,' after the name of their founder, John Wilbur, who are noted for the strictness with which they maintain the traditions and peculiarities of the Society. Some slight indications of theological differences have manifested themselves in England also.

(2) Practice. It is in the application of their leading doctrine of the 'internal light' that the peculiarities of the Friends are most apparent. Believing that it is the Holy Spirit, or the indwelling Christ, that alone maketh wise unto salvation, illumining the mind with true and spiritual knowledge of the deep things of God, they do not consider 'human learning' essential to a minister of the gospel, and look with distrust on the method adopted by other churches for obtaining such—viz. by formally training after a human foshion a body of youths chosen

on no principle of inward fitness. They believe that the call to this work now, as of old, is 'not of men, neither by man, but by Jesus Christ and God the Father,' and that it is bestowed irrespectively of rank, talent, learning, or sex. Consequently, they have no theological halls, professors of divinity, or classes for 'students.' Further, as fitness for the ministry is held to be a free gift of God through bestowed, in support of which they adduce the precept of the Savionr—'Freely ye have received, freely give;' hence those who minister among them are not paid for their labour of love, but, on the other hand, whenever such are engaged from home in the work of the gospel, they are, in the spirit of Christian love, freely entertained, and have all their wants supplied: in short, the Friends maintain the absolutely voluntary character of religious obligations, and that Christians should do all for love, and nothing for money. It also follows from their view of a call to the work of the ministry that women may exhort as well as men, for the 'spirit of Christ' may move them as powerfully as the other sex. The prophecy of Joel as applied by Peter is cited as authority for the preaching of women: 'On my servants and on my handmindens I will pour out in those days of my Spirit, and they shall prophesy.' They also adduce the New Testament examples of Tryphana, Tryphosa, the beloved Persis, and other women who appear to have laboured in the gospel. Their mode of conducting public worship likewise illustrates the entireness of their dependence on the 'internal light.' In other religious hodies the minister has a set form of worship, through which he must go, whether he feels devoutly disposed or nut. This seems objectionable to the Friends, who uncet and remain in silence until they believe themselves moved to speak by the Holy Ghost. Their prayers and praises are, for the most part, silent and inward. They prefer to make melady in their hearts unto God, considering such to be more spiritual than the outward service o

service of the voice.

The doctrine of the 'internal light' has also led the Friends to reject the ordinances of Baptism and the Lord's Suppor as these are observed by other Christians. They believe the Christian buptism to be a spiritual one, and not, like the Jewish and heathen haptisms, one with water; in support of which they quote, among other passages, the words of John the Baptist himself: 'I baptise you with water, but there cameth one after me who shall haptise you with the Holy Ghost and with lire.' Similarly do they regard the rite of the Encharist. It is, say they, inward and spiritual, and consists not in any symbolic breaking of bread and drinking of wine, but in that daily communion with Christ through the Holy Spirit, and through the obedience of faith, by which the believer is nourished and strengthened. They believe that the last words of the dying Redeemer on the cross, 'It is facished,' announced the entire abolition of symbolic rifes, that, under the new spiritual dispensation then introduced, the necessity for such, as a means of arriving at truth, ceased, and that their place has been alundantly supplied by the Comforter, the Holy Chost, whose office it now is to lead and guide men into all truth. The true Unristian supper, according to them, is set forth in revelation— Behold I stand at the door and knock: if any man hear my voice and open the door, I will come in unto him, and will sup with him and he with me. For the same reason—viz. that the teaching of the Spirit is inward and spiritual—the Priends ignore the religious observance of days and times, with the exception of the Sabbath.

The taking or administering of outles is regarded by Friends as inconsistent with the command of FRIENDS

Christ, 'swear not at all,' and with the exhorta-tion of the apostle James—'Above all things, my brethren, swear not, neither by heaven, neither by brethren, swear not, neither by neither any the earth, neither by any other oath: but let your yea be yea, and your nay, nay; lest ye full into condemnation' (see Affirmation). They also refused to pay tithes for the maintenance of what they hold to be a hireling numistry, helicving that Christ put an end to the priesthood and ceremonial usages instituted under the Mosaic dispensation, and that he substituted none in their place. In consequence, all consistent Friends were regularly unleted of plate, furniture, or other goods, to the value of the amount due. The conversion of title into rent-charge (see TITIES), however, has, in the opinion of many Friends, largely removed objections to the payment to this ecclesiastical demand. In regard to the civil magistracy, while they respect and honour it, as ordained of God, they are eare-ful to warn the members of their Society against thoughtlessly incurring its responsibilities, involving as it does the administration of oaths, the issning of orders and warrants in reference to eeclesiastical demands, the calling out of an armed force in cases of civil commotion, and other duties inconsistent with the peaceful principles of the Society. The Friends have likewise consistently protested against war in all its forms; and the Society has repeatedly advised its members against aiding and assisting in the conveyance of saldiers, their hag-gage, arms, ammunition, or military stores. They assisting in the conveyance of sautiers, their haggage, arms, ammunition, or military stores. They regard the profession of arms and lighting, not only as diametrically opposed to the general spirit of Christ, whose advent was sing by angels in these words: 'Clory to God in the highest, and in earth peace, good-will loward men;' but as positively forbidden by such precepts as—'Love your enemies, bless them that curse you, do good to them that hiless them that curse you, do good to them that hate you, and pray for them which despitefully use you and persecute you; also, 'Resist not ovil; but whosoever shall smite thee an thy right check, turn to him the other also;' and, while they acknowledge that temporary calamities may result from adopting this principle of non-resistance, they have so strong a faith in its being essentially the dictate of divine love to the Christian heart that they believe God, by his wise and omnipotent providence, cauld and will yet make it 'mighty to the pulling down of the strongholds of iniquity.' The world, they believe, will by and by canfess that the peace-makers are most truly the children of God. The efforts of the Society for the amuncipation of the slaves are a part of modern British history. They may most certainly lay claim to having cultivated the moral sense of their fellow-countrymen in regard to this important question. As early as 1727 they commonced to 'censure' the traffic in slaves, as a practice 'noither commendable nor allowed,' and gradually warmed in their opposition, until the whole nation felt the glaw, and entered with enthusiasm on the work of abolition. In respect to what may be ealled minor points, the Friends are also very scrupulous; they object to 'halls, gaming-places, horseruces, and playhouses, those nurseries of debauchery and wickedness, the burden and griof of the sober part of other societies as well as of our own.' part of other societies as well as of our own. The Printed Epistlo of the yearly meeting of 1854 contains a warning against indulging in music, especially what goes by the mane of 'sacred music,' and denounces musical exhibitions, such as oratorios, as essentially a 'profanation'—the tendency of these things being, it is alleged, 'to withdraw the soul from that quiet, humble, and retired frame in which prayer and praise may be truly offered with the spirit and with the understanding also.' They object, besides, to 'the hurtful tendency of reading plays, remeaners, novels, and other permicious ing plays, romances, novels, and other pernicious books; and the yearly meeting of 1764 'recom-

mends to every member of our Society to discourage and suppress the same.' A similar recommendation was issued by the Society in 1851 for the benefit of 'younger Friends' in particular, who would appear to have been tasting the forbidden finit. The Printed Epistle of the yearly meeting of 1724 likewise 'advises against imitating the vain enston of wearing or giving mourning, and all extravagant expenses about the interment of the dead,' and this advice has been repeatelly renewed. A multitude of other minute peculiarities, which it would be tedions to note in detail, distinguish the Friends from their rise, by example and precept, urged upon their members 'plainness of speech, behaviour, and apparel,' and lience, in the matters of dress and address, have arisen certain outward peculiarities by which a 'Friend' cauld always be distinguished. In speech they invariably make use of 'thee' and 'thon' in addressing a single person, without respect to rank, station, or authority, and in support of this they plead correct grammar and the example of Scriptine.

They also felt called to cense from denoting the several months of the year and days of the week by the names usually made use of in designating them. Instead of January, February, &c., or Monday, Tuesday, &c., they adopted 'First Month, 'Second Month,' 'First Day,' 'Second Day,' &c. For their practice in this respect they asserted that the names of the days and months used by others were given to them in honour of 'heathen deities,' and this they resolutely refused to countenance. Though there is not now the same uniformity of practice throughout the body in some

of the minor peculiarities, they are to a considerable extent retained and adhered to.

(3) Discipline.—By the term discipline the Friends understand 'all those arrangements and regulations which are instituted for the civil and religious benefit of a Christian clurch.' The necessity for such discipline soon began to make itself fell, and the result was the institution of certain meetings or assemblies. These are four in number: the first, the Preparative meetings; second, the Monthly meetings; third, the Quarterly meetings; and, fourth, the Yearly meetings. The list are usually composed of the members in any given place, in which there are generally two or more Friends of each sex, whose duty is to act as averseers of the meeting, taking congruence of lighthy members. meeting, taking eognisance of births, marriages, burials, removals, &c., the conduct of members, &c., and reporting thereon to the monthly meetings, to whom the executive department of the discipline is chiefly confided. The monthly meetings decide in eases of violation of discipline, and have the power of entting off or discipline, and have the power of entting off or discoving all who by their improper conduct, false doctrines, or other gross errors, bring reproach on the Society, although the accused have the right of appeal to the quarterly meetings, and from these again to the yearly, whose decisions are final. The monthly meetings are also empowered to approve and acknowledge ministers, as well as to appoint 'serious, discreet, and judicions Friends, who are not ministers, tenderly to encourage and help young ministers, and advise others, as they, in the wisdom of God, see occasion. others, as they, in the wisdom of cod, see occasion. They also execute a variety of other important duties. The quarterly meetings are composed of several monthly meetings, and exorcise a sort of general supervision over the latter, from whom they receive reports, and to whom they give such advice and decisions as they think right. The yearly meeting consists of select or representative members of the quarterly meetings. Its function members of the quarterly meetings. Its function is to consider generally the entire condition of the Society in all its aspects. It receives in writing

answers to questions it has previously addressed to the subordinate meeting, deliberates upon them, and legislates accordingly. To it exclusively the legislative power belongs. Though thus constituted somewhat according to Presbyterian order, yet any member of the Society may attend and take part in the proceedings.

Women have also a special sphere of discipline allotted to them: they inspect and relieve the wants of the poor of their own sex, take cognisance of proposal for marriage, deal with female delinquents privately, and inder certain restrictions may even do so officially, though in the 'testimony of discomment' they have always the assistance of members of the other sex.

The Society of Friends, in the multitude of its regulations, has not forgotten the poor; charity in its narrower, as well as in its broader sense, has always been a beautiful feature of its members. The eare of the poor was one of the earliest ovidenees which Christianity afforded to the Gentiles of the superiority and divine character of its principles; and it is honourable to the society that a similar provision for those united to them in relisimilar invision for those under the refrigions fellowship appears to have been one of the earliest occasions of their meetings for discipline. Nevertheless, in accordance with their ruling principle, that all Christian duty should be left for its fulfilment to the spontaneity of Christian love, and not performed under compulsion of any kind, the provision for the poor is purely voluntary; yet their liberality is proverbial throughout Britain and America. Their number at present amounts, it is helicyed, to about 120,000, of whom more than 90,000 belong to the United States.

90,000 belong to the United States.

See Fox's Journal; Sewel's History of the Quakers (1722); Besse's Sufferings of the Quakers (1752); Gurney's Observations on the Peculiarities of the Society of Friends (1824); Neale's History of the Puritans; Rowntree's Quakerism Past and Present (1859); Joseph Smith's Descriptive Catalogue of Books by Friends (2 vols. 1867); Book of Christian Discipline of the Society of Friends (1883); F. Storrs Turner, The Quakers: a Stidy, Historical and Critical (1890).

Friends of the People, an association formed in 1792 in London to obtain parliamentary reform by constitutional means. Among its members were Lords Lauderdale, Kinnaird, John Russell, and Edward Fitzgerald, and such commoners as Grey, Mackintosh, Malcolm Laing, Dudley North, Erskine, Samuel Rogers, and Charilan Sheridan.

Fries, ELYAS, a Swedish hotanist, was born, 15th Angust 1794, in the district of Femsjö in Småland, and studied at Luud, where he early taught botany. In 1834 he was called to the chair of Practical Economics at Upsala, with which in 1851 that of Botany was conjoined. Fries introduced into Sweden the morphological theory in his Systema Orbis Vegetabilis (1825). His Systema Mycologicum (3 vols. 1820-32) was long the standard work on the classification of fungi, of which he gave a relatively complete catalogue in Sumna Vegetabilium Scandinavia (2 vols. Stockholm, 1846-49). He wrote a series of useful books on the Hymenomycetae, on the flow of Scandinavia Dove liehens, and on the flora of Scandinavia, more particularly of Sweden. Among his monographs the Symbolæ ad Historiam Hieraciorum (Upsala, 1848) deserves especial mention. In 1851 Fries was appointed director of the botanical museum and garden at Upsala, and in 1853 rector of the university. He resigned in 1857, and died there, 8th February 1878.

Fries, JAKOB FRIEDRICH, the founder of a philosophic school in Germany, was born at Barby, in Prussian Saxony, 23d August 1773, studied at Leipzig and Jena, and in 1805 was called to Heidel-

berg as professor of Philosophy and Mathematics. In 1816 he accopted a call to the chair of Speculative Philosophy at Jena, but was deprived of his professorship on account of his participation in the demogratic disturbances of 1819. In 1821, professorship on account of his participation in the democratic disturbances of 1819. In 1824, however, he was appointed to the chair of Physics and Mathematics, which he occupied till his death, 10th August 1843. Amongst his more important books are System der Philosophie (1804); Neue Kritik der Vernunft (3 vols. 1807); System der Logik (1811); Handbuch der psychischen Anthropotogie (1820-21); Die Lehren der Liebe, des Glaubens, und der Hoffnung (1823); and Geschichte der Philosophie (1837-40). Taking the Kantian philosophy für his starting-point, Fries demonstrated that intuitive psychology must be the basis of all philosophisuig. Thus, through inner experience a posteriori we learn to know the subjective a priori conditions of knowledge; and through infaitive presentiment or faith we derive our certainty of the reality of things themselves. From inner assurance of the essential worth and From inner assurance of the essential worth and personal dignity of mru flow the definitions and sanctions of ethics, and from the same source originate our resthetic and religious feelings. Henke, J. F. Frics (1867).

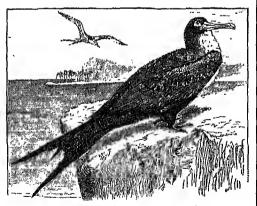
Friesland, or VRIESLAND (ancient Erisia), in its widest sense, as the country of the Frisian race, included the modern provinces of Zeatand, North and South Holland, part of Utrecht, Friesland proper, and Groningen in Holland, together with Prussian East Priesland and a part of Oldenlarg, the western coast of Sleswick between the Eider and the Tondern, and the islands of Sylt, Föhr, Nordstrand, and others. The province of Priesland proper in the Netherlands is hounded N. hy the German Ocean and W. and SW. by the Zuider Zee. It is sometimes called West Priesland Zuider Zee. It is sometimes eather west prosiding to distinguish it from East Priesland. Area, 1282 sq. m.; pop. (1875) 311,246; (1885) 330,866. The land is flat, in some parts below the level of the sea, and is cut up by canals and streams. The lowlands are protected by artificial banks or dykes. Lakes and maislies are numerous. The dykes, Lakes and maishes are numerous. The dykes, shices, and eanals are under the care of a special and spec board, and are kept up at the local express, inland and sea waters abound with lish, pastures cover a third part of the surface. pastures cover a third part of the surface. The horses, cattle, and sheep are all of excellent breeds. Large quantities of peat are dug. The capital is Leenwarden, and the chief port Harlingen, whence are shipped cheese and butter (mostly to London), horses, cattle, leather, and wool. The climate is moist and misty, but not raw. The inhabitants, who are desecuded from the ancient Frisians, speak a peculiar dialect. The industries are unimportant.—East Friesland, with an area of 1200 sq. m., and a pop. amounting (1885) to 211,825, formerly a principality of Westphalia, now forms the Hanoverian district of Anrich; chief towns, Emden and Antich. It is bounded N. by the German Ocean and W. by the Netherlands. Like West Friesland it is low and flat. With the help of the Prissland government the moors are being reclaimed and culgovernment the moors are being reclaimed and cultivated. Fishing and agriculture constitute the chief omployment of the inhabitants, who are Frisians. This province has frequently changed owners since 1744, when the family of Cirksens, in whose progression it had been for the constitution. in whose possession it had been for 300 years, became extinct. It was first coded to Prussia, next incorporated by Napoleon with Holland and France; in 1813 it was restored to Prussia; in 1815 it was ceded to Hanover, along with which it again forms part of Prussia. See FRISLANS, and H. M. Doughty's Friesland Mercs (1889).

Frieze, in classical architecture, the central portion of the Entablature (q.v.). Vitruvius also

calls it the Zopherus ('life-bearing') from its being frequently ornamented with sculpture. Similarly, the term frieze is sometimes applied to any enriched horizontal band.

Frigate (Fr. frégate, Ital. fregata), formerly a long, narrow vessel propelled by oars and sails, used in the Mediterranean on occasions when speed was requisite. The name then came to be applied to men-of-war, of a class smaller than line-of-battle ships, and carrying from twenty to fifty guns, which were distributed on the main and upper decks. They were emplayed in the great wars of the 18th and early part of the 19th centuries, as seents and ernisers. The frigate was usually swift, easily managed, and capable of beating well to windward. She became, therefore, the favourite ship in war-time, and bore off a large proportion of the prizo-money. Frigates also served to obtain information as to the movements of hostile fleets, and to guide the sailing of their own; but it was musual for them to join in the line of battle, their exploits ordinarily occurring in engagements with single ships of their own class. With steam and the growth of the royal navy in later times frigates were developed more than any other menof-war, and many of the largest ships in the mavy helonged to this class, such as the iron-plated Warriar, and 6000 tons, three times the binden of any ship of the line in Nelson's fleets. Now, however, these are all ships of the past, incapable of contending with the turreted monsters which carry modern artiflery, and the name frigate itself has disappeared from the Nany List, the term 'cruiser'—armoured or mannoured—having taken its place. This is true also of the United States navy.

Frigate Bird, or Man-of-war Bird (Tuchypeter aquila), a tropical marine hind, placed near policans and cornorants in the order Steganopades. In flight it is extremely powerful, and makes use of its swiftness and strength to force other birds to surrender their prey. The food consists of fish, which, if not stolen, are eaught at the surface. Flying-fish are said to form an important constituent of its diet. It may be seen out at sen 100 miles from land, but nests and breeds on the coasts of the tropical Atlantic and Pacific—e.g. off Honduras, where vast 'rookerios' have been described. The bird is large, measuing about 4 feet in length, with very long wings and tail.



Frigato Bird (Tachypetes aquila).

The beak is hooked, and almost twice as long as the head. The provalent colour is brownish-black; the female has a white breast, and, like the young birds, differs in minor points from the adult male. In some parts it is said to become half-tame, and even to be available for letter-carrying.

Frigga, in northern mythology, the wife of Odin, who seems to have occupied an analogous position to that of Venns in Roman mythology. She was also the goddess of the earth and of marriage, and was frequently confounded, and latterly quite identified, with Freyja (q.v.). She was the only Scandinavian deity placed amongst the stars; Orion's belt is called in Swedish Frigga's distaff. From her Friday takes its name.

Frilled Lizard. See CHLAMYDOSAURUS.

Fringe Tree (Chionanthus), a genus of Oleacea, of which the common species or Fringe Tree or Snowflower (C. virginica), found in the United States from 39° lat. to the Gulf of Mexico, is a large shrub with very numerons snow-white flowers in panicled racemes. The limb of the corolla is divided into four long linear segments, whence the name frings tree. The fruit is an oral drupe. The tree is frequently cultivated as an ornamental plant. The root bark is navcotic.

Fringillida. See FINCH.

Frisches Haff ('Fresh-water Bay'), a lagoon on the coast of Prussia, south-east of the Gulf of Danzig, about 50 units in length, 4 to 11 units broad, and 332 sq. m. in area. It was once entirely walled aff from the Baltic by a narrow spit of land, through which a passage, 1247 feet wide and 14½ feet deep, was cut in 1510 during a violent storm. The Haff is 10 to 16 feet deep.

storm. The Half is 10 to 16 feet deep.

Fristans, a people of Teutonie stock, who, Tacitus says, when the Romans list enme into contact with them, occupied the maritime region extending from the Scheldt to the Ems and Weser. They submitted to the Roman power in the reign of Drusus, and were loyal and helpful tributaries until string into revolt in 28 a.D. by the extentions of a Roman provincial officer. From that time onwards they rendered only sullen submission to the empire, and more than once revolted and maintained their independence for some years. They were sea-rovers, as well as herdsmen and They were sea-rovers, as well as herdsmen and hushandmen, and took part along with the Angles and Saxons in the conquest of Britain. We next rend of them as offering a stabborn resistance not only to the introduction of Christianity, but also to the enconcluments of the Frankish power from the conth of the production of the frankish power also to the encroachments of the Franksh power from the south; in fact, in spite of the efforts of Wifrid of York, the first missionary among the Frisians, and his successors Willibrord and Bouiface, the Christian religion does not seem to have obtained footing in Frisia beyond the actual limits of Frankish dominion until the complete absorption of the Frisians' land in the empire of Churlemagne. In the meantime they had waged an almost continuous war against the Franks. Their king Radbod, although driven out of western Frisia (from the Scholdt to the Zuider Zee) in 689 by Popin, so far turned the tables after the death of this king that he sailed up the Rhine to Cologne, and defeated Charles Martel, in 716. Their last and defeated Charles Martel, in 716. Their last independent prince, Puppo, was defeated, and slain by Charles Martel in 734, and the conquest of the Frisians was completed by Charlemagne. At the partition of the Frunkish empire made at Verdun in partition of the Frankish empire made at Verdun in 843 Frisia became part of Lotharingia or Lorraine. In 911, however, when Lotharingia seeded from the castern to join the western Frankish empire, the districts of castern Frisia (from the Zuider Zee to the Weser) asserted their independence, and formed themselvos into a sort of democratic confederated republic, until in the first half of the 15th contury they became virtually a countship, being ruled by the dynasty of the Cirksena down to the extinction of the family in 1744, when Prussia took possession of it. Meanwhile the western half of Frisia had for the most part been absorbed in the bishopric of Utrecht and the

count-hip of Holland, though not without a most stubborn resistance on the part of the Frisians, a resistance which had not wholly died out by the end of the 15th century. In fact in 1457 the Emperor Frederick III. recognised their immediate dependence upon the empire. And it was only in 1498 that their staunch love of liberty was finally crushed by Albert of Saxony, whom Maximilian had appointed hereditary imperial governor of Frisia. From 1523, when the governorship fell to Frisia. From 1523, when the governorship reli to Charles V., Frisia became virtually a part of the Netherlands, and from that time onwards shared

their destiny.

The Frisian language is a member of the Low German family, coming intermediate between Old Saxon and Anglo-Saxon. Its most striking peculiarity is the modification of k and y into ts before the letters c and i. The oldest existing specimens of the language do not go back beyond the 14th and 15th centuries, and consist principally of the old law codes and similar official documents (collected in Richthofen, Friesische Kechtsquellen, 1840). The celebrated Lex Frisionum, although it belongs probably to the period of Charlemagne, is composed in Latin, and contains a very meagre sprinkling of Frisian terms. At the present day pure Frisian is spoken only by the peasantry in the west of Dutch Friesland and in one or two isolated districts of Prussian East Friesland, and is cultivated by a small coterie of men of literary taste in Holland. Corrupt forms are spoken in Heligoland and in parts of Jutland and Sleswick. Heigoland and in parts of Juliand and Sieswick. Clysbert Japicx occupies the first place amongst Frisian writers, having published in 1668 a volume of poems entitled Friesche Rijmlerye. Other books held in great esteem by the Frisians are a comedy, Waatze Gribberts Brilloft, dating from the beginning of the 18th century, and the popular work, It Libben fen Augtje Ijsbrants (1827). Het Ocra Linda Bok, of which an English edition appeared in 1877 though purporting to be of vect automity. Linda Bok, of which an English edition appeared in 1877, though purporting to be of vast antiquity, was really written by a ship-carpenter, Over de Linden (1811-73). Besides these, quite modern works have been written by E. and J. II. Halbertsma, Salverda, Posthumus, Windsma, Dykstra, Deketh, Van der Veen, Van Assen, and others. The most important production in northern Prision, the correct dielect of Lutland and Sleep. Frisian, the corrupt dialect of Jutland and Sleswiek, is Hansen's comedy De Gidtshals. A society was founded at Francker in 1829 for the study of the Frisian language and history.

The most complete accounts of Frisian literature are perhaps to be found in Mone, Ucbersicht der niederlandischen Volkslitteratur alterer Zeit (1838), and Winkler, Allgemeen nederduitsch en friesah Didlecticon (1872). For the study of the language, see grammars by Rask, Grimm, Heyne, and A. H. Cummins (2d ed. Lond. 1888), grammars, dictionaries, &c. by Richthofen (1840), J. Halbertsma (1874), Cadovins Müller (died 1725), Ten Doornkaat-Koolman (1877-85), Dirksen (1889), Outzen (1837), Bendsen (1860), and Johansen (1862).

(1862)

Frit (Chlorops frit), a small black Dipterons corn-fly, common in North Europe, not known in Britain, doing great damage especially to barley (see CORN INSECTS).

Frith. Sec Firth.

Frith, JOHN, reformer, was born about 1503 at Westerham, Kent, and from Eton passed to King's College, Cambridge, whence in 1525 Wolsey summoned him to his new foundation at Oxford. A twelvementh later, however, suspicion of heresy drove him a fugitive to the young Protestant university of Marburg, and during his five years' stay here he saw much of Tyndalc and Patrick Hamilton, and wrote several Protestant treatises. Venturing back to England in 1532, he was seized and lodged in the Tower, and on 4th July 1533 was burned at Smithfield. He has been called the author of the Anglican doctrine of the Encharist.

Frith, William Powell, R.A., was born at Aldfield, Yorkshire, on the 9th damary 1819. He studied art at Sass's Academy, London, and in the schools of the Royal Academy; and in 1810 exhibited his 'Othello and Desdemona' in the British Institution. He painted portraits, and his early subject pictures were seenes from the English early subject-pictures were seenes from the English and French classics. His 'Conting of Age in the Olden Time' first brought its painter into notice, and his eclebrity was increased by 'Rannsgate Sands' (1854); 'The Derby Day' (1858); and 'The Railway Station' (1862). His later works include 'Charles H.'s Last Sunday' (1867); 'Before Dinner at Boswell's Lodgings' (1868), which in 1875 sold for £4567; the gambling subjects entitled 'The Road to Ruin' (1878); and 'A Private View, a Scene at the Royal Academy' Private View, a Scene at the Royal Academy

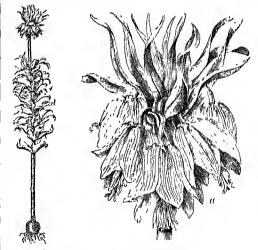
(1883). His producdestiwhile tions, inte of the finer artistic qualities, have been extremely popular on account of the interest of their subjects and their obvions dramatic point, and have become have become widely known by means of engravings. He was elected A. R. A. in 1846, and R.A. in 1852; and his pleas-Autobiographyand Reminiscences (3 vols.) was published 1887-88,

Frithjof's Saga. See ICE-LAND and TEGNER.

Fritilla'ry (Fritillaria, a genus of Liliaece, closely allied to the lily and

Common Pritillary (Fritillaria meleagris).

tulip, herbaceous, bulbous-rooted, with bell-shaped perianth of six distinct segments, each having a conspicuous circular nectary at the base,



Crown Imperial (Fritillaria imperialis): a, flower onlarged.

twenty species are known, all pahearctic. All o them have drooping flowers; some of them are beautiful. One species only is a native of Britain, the Common Fritillary (F. meteagris), also called Snake's Head, Chequer-flower, &c., which is found in meadows and pastures in the east and south of England, flowering in April or May. They are specially plentiful in the Magdalen water-meadows, Oxford. The flowers are pale or dark purple, tesselated with dark markings, sometimes creamwhite. Many varieties are in enlitivation.—This genus includes the Crown Imperial (F. imperials), which was brought from Persia to Constantinople in the 16th century, and thence introduced through the imperial garden at Vienna into western Europe, where it soon became a constant inmate of the herbaceous border. The bulb of the commen species, but still more of this one, is poisonous.

Fricillary, a name given to a number of batterlies (Argynnis, Melitica, &c.), some of which are common in Britain, from the resemblance of the colouring on the upper surface of their wings to that of the flowers of the common fritillary.

Friuli (Ger. Friand, Lat. Forum Julii), the name of a district formerly governed by independent dukes, lying at the head of the Gulf of Venice. With a total population of about 700,000, and a total area of some 3470 sq. m., it is divided between Austrian Friuli, embracing the districts of Görz, Gradisca, and Idria, and Italian Friuli, including the province of Udine and the district of Portogramo. Friuli is rich in corn and wine, and lass much metallic wealth and numerous mineral springs. The inhabitants, called Furlani, are mostly Italians, some of them speaking a peculiar dialect containing several Colite elements. Friuli constituted one of the thirty-six duchies into which the Lombards divided the north of Italy, and shared the vicissitudes of its neighbour states.

Frobenius, Joannes, the learned printer, was horn in Franconia in 1460, founded a printingollice at Basel in 1491, and published a Latin Bible, editions of Cyprian, Tertullian, Hilary, Aubrose, and the Greek New Testament (1496). As correctors to the press he employed such men as Geolampadius and Erasmus; and between 1491 and 1527, the year of his death, he issued 300 works (including all those of Erasmus), well printed and wonderfully free of error.

Frohisher, Sir Martin, one of the great Elizabethan seamen, was born in Yorkshire, either at Altofts (near Wakefield) or at Doncaster about 1535. Sont to sea as a boy, he traded to Gainea and elsowhere, and seems at an early age to have become possessed by his life-long dream of a northwest passage to Cathay. After long solicitations he was enabled, chielly by help of Warwick, to set sail northwards round the Shetland Islands, 7th June 1576, with the Gabriel and the Alichael of 20 tons each and a pinnace of 10 tons, with a total complement of thirty-five men. The pinnace was soon lost in the storms that followed, and the Michael deserted, but Frohisher held on his adventurons course, was almost lost on the coast of Greenland, and reached Labrador on the 28th July. From Hall's Island at the mouth of Frohisher Bay his men carried away some black early, which was supposed in London, whither he arrived on October 9th, to contain gold. Next year a new expedition was fitted out with much enthusiasm, the queen herself supplying from the royal navy a vessel of 200 tons. The country around Hall's Island was formally taken and named Meta Incognita, and alundance of the black earth was brought to England. Yet another and well-appointed expedition was despatched in 1578, but was harassed by storms without and dissensions within, and returned home with a great eargo of the ore, from which, however, no more

gold could be extracted. Of Frobisher we hear but little during the next tew years, but in 1585 he commanded a vessel in Drake's expedition to the West Indies, did good service in the preparatory task of hampering the designs of Spain, and in the struggle with the Armada covered himself with glory by his conduct in the Triumph, and was rewarded by the honour of knighthood. Frobisher next married a daughter of Lord Wentworth, and settled down as a country gentleman, but was soon again at the more congenial task of seonring the seas for the treasure-ships of Spain. At the siege of Crozon near Brest in the November of 1594 he received a wound of which he died at Plymonth on the 22d of the same month. His Three Voyages were edited by Admiral Collinson for the Hakhnyt Society (1867). There is a bife by Rev. F. Jones (1878).

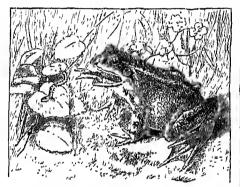
Frobisher Bay, an inlet opening westward near the month of Davis Strait into the territory called by Frobisher Meta Incognita, at the southern end of Balin Land. It is about 200 miles long by above 20 wide, with negged mountainous shores. It was till Ital's voyage called Frobisher Strait, being erroneously regarded as a passage into Hudson Bay.

Froebel, FRIEDRICH WILHELM AUGUST, German educational reformer, was born at Oberweissbach in Thuringia, 21st April 1782. His studies at Jena being interrupted by the death of his father in 1802, he was compelled to shift as best he could for a living, until in 1805, at Frankfort-on-the-Main, he found his true vocation in teaching. The next five years he spent partly at Frankford, partly at Yverdon in Switzerland, at the latter place in close intimacy with Pestalozzi. Then fer a couple of years he resumed his studies, this time chiefly in the natural sciences, at (lottinger and Berlin. But again they were interrupted: the War of Liberation broke out, and Frochel joined Litzow's corps. Two years after the conclusion of zow's corps. Two years after the conclusion of peace he got his first opportunity to realise his long-meditated principles of education; he made a start at Griesheim in Thuringia, but in the fellowing year (1817) transferred his school to Keilhau, where he was shortly afterwards joined by his devoted friends and disciples, Langethal and Middendorff. At this time the characteristic idea of his teaching was that the root of all educational development is action, which has for its ultimate aim not only mere physical exercise, but also the unfelding and strongthening of the mental powers; and underlying this was the conviction that the real purpose of education should be to encourage the child to grow naturally and spontaneously, unfolding all its powers according to the inner organic laws of its being, just as grow plants and animals and crystals. In 1826 he expounded his views in a work entitled Die Menschenerzichung. With the view of extending his system, Froebel in 1831 established a branch institution in the canton of Incorne in Switzerland, which, however, could never make headway against the opposition of the Roman Catholic elergy. Hence, after starting an orphanage at Burgdorf in Bern, where also he began to train teachers for educational work, Proceed returned to the centre of Germany, and in 1836 opened at Blankenburg, not far from Keilhau, his lirst Kindergarten (q.v.) school. The rest of his life was spent in the advocacy of kindergarten schools and in organising them; but along with these labours he combined the training of teachers to carry on the system he had devised. He died on 21st June 1852 at Marienthal in Thuringia. He died Froole's works were collected and published by Wichard Lange in 1862-63 (new ed. 1874), also by Seidel in 1883. See Autobiography of F. Frobel

FROG 12

(Lond. 1886); Life of Frocbel, by Emily Shirreff (Lond. 1887); and his Letters, translated by Moore and Michaelis (1890).

Frog, a genus (Rana) of tailless Amphibians; but the name, usually with some prefix or other, is often extended to the members of related genera or even of related families-e.g. to the obstetric frog (Alyte-), to the tree-frogs (Hylidre), or to the peeping frogs (Hylodes). The common frog in Britain is Rana temporaria, distinguished from the edible frog, R. esculenta, which has been introduced into Britain, by slight differences in colouring, by the presence of a dark, triangular patch extending backwards from the eye, and by the absence of the dilatable sacs (at the back corners of the month) which intensify the croaking of the 'Cambridge-shire Nightingales.' The general shape is an elongated oval, of which the head occupies about a third; a hump on the back marks the end of the distinct vertebre and the beginning of an unsegmented portion known as the mostyle. The tail has completely disappeared, the young annual having literally lived upon it during part of its



Common Frog (Rana temporaria).

metamorphosis. The arms are short, the fingers four and unwebbed, and the innermost is swollen in the males; the hind-legs are long and unuscular, well adapted for both leaping and swimming, with an elongated ankle, five webbed toes, and an internal 'tarsal tuberele' like a hint of a sixth. The skin is soft and glandular, with pigment cells admitting by their changes of a slight alteration in colour. The external nostrils are situated near the tire of the great the age have a morable tion in colour. The external nostrils are situated near the tip of the snont; the eyes have a movable lower lid; the tympanum or dram of the ear is readily seen somewhat farther back.

readily seen somewhat faither back.

General Life.—The frog, aquatic in its youth, generally remains near water. In dry weather it hides itself, and great numbers are often seen to issue forth on the welcome return of rain. Their leaping and swimming deftness need no remark. The adults feed upon living animals, insects, and shows. slugs. These are caught on the large viscid tongue, which being fixed in front of the month and free behind, can be thrown rapidly ontwards, and even more rapidly retracted. In winter the frog 'hibernates' or lies torpid, buried in the und at the bottom of the pool, and great numbers of individuals may be dug up in winter all clustered together. During this season certain 'fatty bodies,' situated on the top of the reproductive organs, and apparently degenerate portions of the kidney, become reduced in size, being probably the ovaries and testes, which become functional in the month of March. Then it is that the frogs congregate together for breeding purposes, and that the males with their vigorous croaking screnade their more weakly-voiced mates, preceding the birds in These are caught on the large viscid tongue, more weakly-voiced mates, preceding the birds in

announcing the approach of spring. The titles bullfrog, blacksmith-frog, sugar-miller, &c., applied to certain species, obviously refer to their notable vocal powers.

The frog generally contains some interesting parasites—a heromophyodite threadworm or Nematale (Angiostomum nigrovenosum) in the lungs, a fluke or Trematode with many suckers (Polystomana integerrinum) in the bladder, and a ciliated in-

integerimum) in the bladder, and a ciliated fu-fusorian with many unclei (Opalina randrum) in the hindmost part of the alimentary canal. Life-history.—The eggs of the frog are familiar to almost all; each is a little dark ball enclosed in a glutinous sheath which swells in the water into a clear round globe. The egg has most black pig-ment in its upper half, the beavier yolk sinking for the most part to the lower benisphere. They are fertilized just as they leave the founde, which are fertilised just as they leave the female, which the male is at the same time embracing. The division of the ownm is complete but unequal, the upper hemisphere with the 'formative protoplasm soon exhibiting a larger number of smaller cells than the lower portion, which chiefly consists of yolk to be gradually absorbed by the embryo (sea EMPRYOLOGY).

By the tenth day after the eggs are laid the head, body, and fail of the young frog may be distinctly seen. Pollowing the lines of its ancestral history (why or how is a difficult question), the animal becomes lish-like, with a long tail and with three pairs of external gills on its neck. About a few table of the large of fortnight after the laying the young ladpoles are hatched, and, jerking themselves out of the gelatin-ous mass, swim freely in the water. They are still monthless, and live on their still unexhausted capital of yolk. They have a paired sneker under-neath their level by capital of yolk. They have a paired sucker under-neath their head, by means of which when tired they attach themselves to water-weeds or other objects. In a few days, however, they gain a month, 'bordered by a pair of horny jaws, and fringed with fleshy lips provided with horny papille.' The whole arrangement reminds one of that of the lamprey. As the tudpole hungrily feeds on fresh-water weeds (algre, &c.), the hitherto shortalimentary cannel becomes changated. furnished shortalimentary canal becomes clongated, furnished with a liver and panereas, and, when the animal is big enough to dissect, may be readily seen coiled up like a watch-spring. About the time when mouth and anus have been opened the tenr gill-slits or elefts, opening from the pharynx to the exterior, may also be seen, and very soon the original ex-ternal gills shrivel, and are replaced by an internal set. As the latter develop, a fold of skin grows over them, forming a gill-clumber which by-and-by closes so unch that only a single oxit aperture remains, and that on the left side. Through this the water taken in for respiration by the month passes to the exterior, after washing the gills on its

way.
The tadpole thrives on its vegetarian diet, and rapidly grows bigger and stronger; the large tail is a powerful swimming organ, and the adhesive suckers are less and less used. The limbs bud forth, but the anterior pair, hidden by the gill-covers above referred to, ure longer of becoming distinctly visible. By the end of the second month the tadpole has attained to the level of the doublethe tacque has attained to the tever of the double-breathing fishes or Dipnol (see FISHES); in other words, the Imags become useful, the gills for a while persist, but, as the animals get into the hubit of coming oftener to the surface to breathe, these latter organs gradually degenerate.

Two or three weeks more, and a remarkable of the surface of the surface of the surface weeks more.

Two or three weeks more, and a remarkable change—a metamorphosis—occurs, in which the tadpole rises above the fish level and becomes a distinct amphibian (see AMPURIMA, for figures, &c.). The tadpole ceases to feed upon algae, and begins to live at the expense of its tail, from which

wandering blood-cells or 'leneocytes' earry the of the onter layer of skin takes place; the gills are finally lost; 'the horny jaws me thrown off; the large frilled lips sbrink up; the mouth loses its nonded suctorial form and becomes much wider; the tongue, previously small, increases considerably in size; the eyes, which as yet have been beneath the skin, become exposed; the fore-limbs appear, the left one being pushed through the sport-like opening of the branchial chamber, and the right one forcing its way through the operentar fold, in which it leaves a ragged hole (Milnes Marshall). As these momentous changes progress, and as the supply of food afforded by the tail begins to be exhausted, the animal recovers its appetite, but this time carnivorously, feeding on available animal matter, or even on its fellows. At this stage tadpoles will clean a skeleton beautifully, and Buckland describes them as showing a great and buckand describes them as showing a great avidity for animal food, crowding round a dead kitten, and nibbling at the toes of little boys who wade in pools where they abound. With the change of diet the abdomen shrinks, stomach and liver enlarge, the intestines become both narrower and shorter. The tail shortens more and more tall it is completely absorbed; the hind-limbs lengthen; and eventually the animal leaps ashore-a tiny frog. For a considerable time the tadpole appears to be neither male nor female, but differences in no neither little flar feither, but differences in mutrition, &c. decide the question of sex. In ordinary circumstances there are about as many males as there are females, but Jung has shown that by increasing the quality of food from fish to beef, from boof to frog flesh, he could increase the percentage of females to about ninety. See EMMEYOLOGY, ENVIRONMENT, REPRODUCTION, SEX; while for details of life-history, Milnes Marshall's beat should be consulted. book should be consulted.

Distribution and Related Species.—The common Brown Frog (R. temporaria) is widely distributed in Europe and Asia; 'it is the most northerly of known species, ranging in Norway to beyond the seventieth parallel of latitude. In the Alps it still frequents the waters at an elevation of 8000 feet. It is of course abundant in most parts of Britain, and is common enough in Iroland, where, however, it is said to have been introduced in 1696.

Of wider distribution is the Green or Edible Frog (R. esculenta), which also occurs in Britain, though not believed to be indigenous. Its habitat extends from Scandinavia to North Africa, from France to Japan. Widely distributed in the United States are two forms—the Shade or Loopard-frog (R. hale-cina) and the Wood-frog (R. sylvatica)—which some regard as identical with our common species. The common Bull-frog of North America (R. catesbiana) is often brought to European zoological gardens, has an appetite big enough to engulph a sparrow, and a croaking power proportionate to its large size. Like the calble frog on the Continent, it is not unfrequently cooked. A large Indian it is not intrequently cooked. A large mathine species (R. tigrina), another relatively large, toad-like species (R. adsperse) from tropical Africa, a single species from West Australia (R. papua), and another solitary form (R. krefftit) from the Solomon Islands deserve to be mentioned. The genus is unrepresented in the southern parts of South America and in New Zealand.

Rindra and in New Zentand.

Related Genera.—The family of true frogs or Ranidw includes about two hundred species, ranked in eighteen genera. They have always teeth in the upper jaw, and a certain technical peculiarity in the breastbone. One of the most curious forms (which have always teeth in the upper jaw) is the arboreal genus Rhacophorus, the 'flying frog' described by Wallace, in which the webs between both fingers and toes are much developed. The tips of the

fingers are dilated, and serve for attachment to smooth or vertical surfaces. The arboreal habit is a resource which brings with it several physiological adaptations, which must not be too much insisted upon in classification, for, as Huxley observes, the common brown frog 'at a year old will climb up the vertical side of a glass vessel, flattening out the ends of its toes, and applying its belly against the surface of the glass, like a tree-frog. Frogs, like other amphibiums, are usually unrepresented in occanic islands, but, besides the species of Rana already mentioned as occurring in the Solomon Islands, three fours of Cornufer, ranked among the Ranidge, ought to be noted on account of their adaptations, which must not be too much insisted Ranida, ought to be noted on account of their habitat in the Fiji Islands. The Dendrobatida form a family of small tree-frogs nearly allied to the Ranide, but without teeth. From one species (D. tinctocias) the savage tribes of some parts of South America are said to extract a deadly poison for their arrows. Less nearly allied to the Ranidæ are the toothless toads (Bufonidae), the horned toad (Ceratophrys), the true tree-frogs (Hylidie), the 'midwife-tond' or obstetrie frog (Alytes obstetricans), the tongueless Sarinam tond (Pipa americana), which are separately discussed (see Toad, Thee-price, &c.).

The use of frogs for food is regarded with unnecessary prejudice in Britain, but is very common on the continent of Europe. The species chiefly on the continent of Europe. The species chiefly used is the edible frog (*I. csculenta*), which greatly abounds in ponds and slow streams in Franco, southern Germany, and Italy. They are taken for the market by nets and by a kind of rake, and are sometimes specially fattened in preserves. The hind-legs are most frequently coaked, but other muscular parts may be utilised. They are usually dressed with sauces, and in flavour and tenderness are comparable to chicken. The African species (R. adspecsus) is said to be much used by the native tribes, and the gigantic bull-frog figures as a rarity in the transathantic menu. The frog furnishes a very convenient vertebrate type to the comparative anatomist, embryologist, and physiologist, and is in this connection much more nseful than on the dining-table.

nseful than on the dining-table.

See Amphibia, Bulli-Prou, New 7, Tead, Tribe-Frod; and for showers of frogs, Showers. See also St George Mivart, The Common Froy ('Nature' series, Lond. 1874); A. Milnes Marshull, The Froy: an Introduction to Amatomy, Histology, and Embryology (3d ed. 1888); Ecker and Wiedershom, Anatomic des Frosches (3 parts, 1804, 1881, 1882; trans. by Haslam, 1889); for figures, G. I. Howes, Altus of Practical Elementary Biology (1885); Bell's British Reptiles (1839); Leydig's Anura Babrachia d. Deutschen Frana (Dom, 1877); Hoffmann in Brom's Thierreich, VI. (1873-78); British Museum Catalogue of Amphibia; and Hatchett Jackson and Rolleston, Forms of Animal Life (1888).

Frog. Figuras.

Frog, FISHING See ANGLER.

Frogbit (Hydrocharis morsus rane), a small aquatic plant of the order Hydrocharidacen, allied to the water-soldier (Stratiotes), but with fleating leaves.

Frogged, a term used in regard to uniforms, and applied to stripes or workings of braid or lace, as ornaments, mostly on the breast of a cont.

Frogmore, an English royal palace and man-solum in the park of Windsor, Berkshire. The palace, purchased by Queen Charlotte in 1800, has wales since 1861. The mansolenin, a Romanesque edifice, craciform in shape and surmounted by an octagonal dome, is consecrated to the memory of the Prince Consort, whose remains were transferred to it on 18th December 1862.

Frog-spit, or Cuckoo-spit. See Froth-FLY, Frohsdorf, a village in Lewer Austria, 30 miles S. of Vienna, on the river Leitha, and near the frontiers of Hungary. It is celebrated for its splendid castle, which acquired a kind of political importance from having from 1844 till 1883 been the rendezvous of the clder Bourbon party and the residence of the Comto de Chambord (q.v.).

Froisart, Jean, was horn at Valenciennes about 1337. His father was a painter of armorial hearings. He was educated for the church, but spent his youth in gaiety and dissipation, being, by his own confession, a dear lover of dances and carolling, of minstrelsy and tales of glee. 'My ears, he says, 'quickened at the sound of un-corking the wine-flask, for I took great pleasure in drinking, and in fair array, and in delicate and fresh cates. When he was twenty years of age, he began, at the command of his 'dear Lord and Master, the Sieur Robert of Namur, Lord of Beaufort,' to write the history of the wars waged during his days in France, England, Scotland, and Spain. The first part of his Chronicle, which deals with the events of the years 1326-56, was principally compiled from the writings of one Jean le Bel, Canon of Liege. Having completed this section of his work in 1360, Froissart set out on his long travels in quest of adventure and good company, and that in diest of accenture and good company, and that brilliant spectacle of martial and courtly pageantry in which all through his life he found unsating delight. The first country which he visited was England, where he received a gracious welcome from Philippa of Hainault, the wife of Edward III. Philippa appointed him her secretary or clerk of her chamber, a post which he held for some years, but which he resigned on account of a hapless passion for a lady of Flanders. In 1364 he travelled through part of Scotland, riding, he informs us, on a grey palfrey with his value behind him, and having a white greyhound as his only companion. His reputation as a poet and historian, his gay and courteous converse secured him on his gay and courteous converse, secured him an the was the guest of King David Bruce, and was entertained for fitteen days at Dalkeith Castle by William, Earl of Douglas, the exploits of whose honse he has frequently celebrated in his Chronicle. In 1366 he journeyed to Aquitainc in the retinue of the Black Prince, who would not, however, allow him to accompany the Spanish expedition, but sent him to accompany the Spanish expedition, but sent him to accompany the Spanish expedition, but send him back to his patroness, Queen Philippa. Two years later we find him in Italy, where he was present, along with Chancer and Petrarch, at the marriage of Lionel, Duke of Clarence, son of Edward III., with Jolande of Milan, the daughter of Galeazzo Visconti. For a time he settled at Lestines, in the diocese of Liège, where he obtained a curacy, and where he confuses 500 frames very a curacy, and where he confesses 500 francs very quickly passed from him to the vintners, 'It may be conjectured,' says Sir Walter Scott, 'that they were more obliged to his attention than any of his other parishioners.' Before 1384 he had attached himself to Wenceslas, Dake of Brabant, whose verses he collected along with certain pieces whose verses he conected along with certain pieces of his own, under the title of Meliador, or the Knight of the Golden Sun. On the death of Wenceslas, Froissart repaired to the court of Guy, Count of Blois, who persuaded him to devote himself to his Chronicle. The second volume of the work was finished about 1989 and always the work was finished about 1989 and always the the work was finished about 1388, and about the same date its author set out from Blois on a visit to Gaston Phebus, Count de Foix. This journey, of which he has left a very entertaining record, he or which he has left a very entertaining record, he performed in the company of the good knight Espaing de Lyon, who told him of the deeds of emprise that had lately been done at the various towns and eastles by which they passed in the course of their wayfaring. After making a long sojourn at Orthez with the Count de Foix, of whose court he has left as a description which is canelly court he has left us a description which is equally vivid and charming, Froissart, about the year

1390, settled for n while in Planders, and resumed work on his Chroniele. In 1395 he again yielded to the old roving impulse. He revisited England, was cordially welcomed by King Richard 11, and remained abroad for about three months. He then returned to Chimay, where he had obtained a canonry, and where he ended his days in 1410.

Froissart's famous book deals with the period between 1326 and 1400. Mainly occupied with the affairs of France, England, Scotland, and Flanders, he likewise supplies much valuable information in regard to Germany, Italy, and Spain, and even touches occasionally on the course of events in Hungary and the Balkan peninsula. Except in the first part of the work, he made little use of the writings of others. An historian errant, he gathered his materials in courts and on highways, from the lips of the lords and knights, the squires and the heralds whom he encountered. The charm of his book is perennial. He is of all medieval chroniclers the most vivid and entertaining. 'His history,' says Sir Walter Scott (who called the work his tiber Sir Walter Scott (who called the work his titer carissimus), 'has less the air of a narrative than of a dramatic representation.' He was a born story-teller; his pages glow with colour; his narrative glides easily and gracefully along; and he is, on the whole, accurate and impartial in his statements. ments. 'In certain of his battle pieces,' says Villo-main, 'Froissart's style is truly Homeric,' and the tribute is justly merited. The main defects in his work are the frequent repetitions and the negligent arrangement of the facts. He has been re-proached for not laving esponsed the cause of the French against the English, as if it were to be expected that a Flemish priest, in his youth the favourite and secretary of Edward III is queen, should share the burning patriotism, the intense hatred of England that animated such writers as native of England that animated such witters as Alain Chartier and Eustache Deschamps. More plansibly might he he arraigned for indifference to the sufferings of the townsmen and peasants. He is enamoured of the pageants of chivalry, engrossed in the deeds of nobles and knights. No writer could well make less pretence to act the pageants are that but hardly any histories. moralist's part, but hardly any historian has been so uniformly delightful. He was likewise the anthor of a considerable body of verses bullades, rondeaux, virelais, &c.—nn edition of which was published by Buchon (Paris, 1829). Buchon also produced an excellent edition of his Chronicle (15 vols. Paris, 1824–26). The work was translated in 1523–25 by John Bourchier, second Lord Berners (1467–1533), and of his version there is an edition by Utterson (2 vols. 1812); a modern translation is that of Colonel Thomas Johnes (4 vols. 1803–5).

Frome, or Frome Selwood, a market-town of Somersetshire, on the Frome, a branch of the Avon, 12 miles S. of Bath (19 by rail). The surrounding country is very picturesque, and the town, until modernised early in the 19th century by the formation of two wide thoroughfares, was a quaint old place, with narrow, crooked, steep streets. Its parish church is a fine Decorated building splondidly restored by the late Rov. W. Bennett (q.v.), with a spire 120 feet high, stations of the cross, and the grave of Bishop Ken. Frome's specialties are broadcloths and other line woollens, and it also produces cards for dressing cloth, ale, silk &c. Pop. (1851) 10,148; (1881) 9376. Till 1885 Frome returned one member to parliament. The once celebrated forest of Selwood was in the vicinity.

Fromentin, Eugene, painter and author, was born at La Rochelle in 1820. He studied under Cabat the landscape-painter; and from 1842 to 1846 travelled in the East, which is the scene of almost all his works. His pictures are admirably true in their local colouring, and reproduce with

great spirit the free nomad life of the Arab and his steed. Among his more important works are 'Arabs attacked by a Lioness' (1868), 'Halt of the Muleteers' (1869), 'A Souvenir of Esneh' (1876), and 'The Nile' (1876). His 'Cenriers,' 'Country of the Ouled-Nayls,' 'Spiringtime' (1861), and his 'Falconry in Algiers: the Quarry' (1863) are in the Louvre. But he was no less prolific with his pen than with his brush. He published an account of his travels in Le Pays, under the titles of 'Visites Artistiques' and 'Simples Pelerinages' (1852–56); and 'Une Année dans le Sahel' (1868) recorded the vesults of his investigations for the Committee of Historic Monuments. He also produced a successful remance, Dominique (1863). English translations of his Les Maitres d'Autrefois (1876), an admirable criticism mon the Intel and Flemish painters, as well as of his hife by Louis Gense (1881), have been published in America. He became a 'chevalier' of the Legion of Honour in 1859 and an 'officier' in 1869; and died at St Manrice, near La Rochelle, 27th August 1876. See Gense, Engéne Fromentin (Paris, 1881).

Frond, in Botany, a term often used to designate the leaves of cryptogamous plants. It was originally introduced as distinctive of organs in which the functions of stem and leaf are combined. The term leaf is now very generally used even of mosses, forms, &c., and the term thallus is applied to liverworts and lichens. In the case of many Algre the term is often used to designate the whole plant except its organs of reproduction.

Fronde, the name (indicating the sling used by the loops of Paris in their mimic fights) given to certain factions in France during the minority of Louis XIV., which were hostile to the court and the minister, Mazarin, and gave rise to a series of civil dissensions from 1648 to 1654. The grasping and despotic policy of Mazarin, to whom Aure of Austria, the queen-regent, had alandoned the reins of government, had given offence to all classes. The entire nation was allame with discontent: the nobles were jealous of the employment of foreigners in the chief offices of state; the people kicked against the oppressive taxation; the parliaments resented the wilful disregard of their authority. At length the parliament of Paris refused to register the royal edicts, more especially the linaucial measures increasing the burdens of taxation. Mazarin in retaliation ordered the arrest (26th Angust 1648) of the president and one of the councillors, Peter Bronssel. Thereupon the people took up arms. The court fled to Ruel in October, but early in 1649 removed to St Germain. The populace and parliament were joined by the dis-contented nobles, Conti, Longueville, Beaufort, Turenne, and De Retz. But the arrival of Conde, the champion of the royal party, who proceeded to lay siege to Paris, soon turned the tide. An agreement was therefore come to between court and parliament at Ruel on 1st April 1649, the people being released from the obnoxious taxes, whilst Mazzrin and the foreigners were allowed to retain their offices. This ends the movement called the Old Fronde, a centest carried on in the interests of the people. The New Fronde was at bottom a struggle between Condé and Mazarin. The nobles, struggle between Conde and Mazzarn. The holies, especially Condé, were far from boing satisfied with the compact of Ruel, and opened negotiations with Spain for assistance from the Netherlands. But on the 18th January 1650 the queen-regent suddenly arrested Condé, Longueville, and Conti. This arhitrary proceeding roused the provinces. The Duchess of Condé stirred up the south of Evapora. The Duchess of Longueville (Condé's France. The Duchess of Longueville (Condé's sister) won over Turenne, who threatened Paris, but was defeated at Rethel. Nevertheless the Nevertheless the

storm was so great that Mazarin was obliged to release the princes, and flee from the country. Now, however, a kalcidoscopic movement changed the relations of the principal actors in the affair. Condé withdrew to Gnienne; De Retz was bribed by the gift of a cardinal's hat; Threnne went over to the court; and Mazarin was recalled and reinstated in power. Meanwhile, Louis XIV., who, having now attained his fourteenth year, was declared to be of age, endeavoured to induce Condé to return; but the latter, mistrusting these overtures, commenced a regular war against the court, until he was defeated by Turenne near Paris on 2d July 1652. Condé found refuge within the capital; but the citizens, grown weary of the whole husiness, apened negotiations with the king, only demanding the removal of Mazarin to return to their allegiance. This demand was complied with and a general amnesty proclaimed (1653). Condé, who refused to enter into the compact, repaired to Champagne; but, finding no one disposed to take up arms in his cause, he entered the Spanish service. Shortly afterwards Mazarin was onee more recalled to Paris, and again entrusted with the reins of government. The parliament of Paris was completely humbled, so much so that its political existence was virtually suspended for a centarry and a half. Thus the royal power came forth victorions from the contest. See Ste-Aulaire's Histoire de la Fronde (2d ed. 1860), Bazin's France sous Louis XIII. et Mazarin (2d ed. 1846), and Fitzpatrick's Great Condé and the Fronde (1873).

Frontenac, Louis de Buade, Comte de governor of New France, was born in 1620, entered the army in 1635, and at an early age became brigadier. In 1672 he was appointed governor of the French possessions in North America, to be recalled ten years later, in consequence of endless quarrels with his intendant and the Jesnits; but in spite of his violent temper he had gained the conlidence of the settlers and the respect of the Indians, and in 1689, when to the horror of constant attacks from the Iroquois the misery of a war with England was added, he was again sent out by the king, as the only man who could rouse the despairing colonists to hope and action. During the next nine years he loosed his savage allies on the defenceless villages of New England, repulsed a British attack on Quebec, and so broke the power of the Iroquois that they were never again a terror to the colony. He died at Quebec in 1698. See Francis Parkman's Count Frontenac and New France under Louis XIV. (Boston, 1877).

Frontinus, Sextus Julius, a Roman author and administrator who flourished in the second half of the 1st century. In 75 A.D. he was appointed governor of Britain, where he conquered the Silnres, and vigorously maintained the imperial authority. He was twice consul in the course of his life, and in 97 was made superintendent of the water-works at Rome. He died about 104. Several works are attributed to Frontinus, only two of which are certainly genuine, the Strategenuticon, a treatise on the Art of War, in four books, and the De Aquis Urbis Rome, in two. His works have been edited by Dederich (Leip. 1855).

Fronto, Marcus Cornelius, Latin rhetorician, was horn at Cirta, in Numidia, about 100 A.D. In consequence of his reputation as an orator and pleader, he was entrusted by Antoninus Pius with the education of Marcus Anrelius and Lucius Verus. In 143 he was consul. He died about 170. The two series of Fronto's lettors to Marcus Aurelius, discovered by Mai in 1815, do not bear out the reputation for eloquence and intellectual force ascribed to the rhetorician by his contemporaries.

A critical edition was published by Niebuhr in 1816, and another by Naber in 1867.

Frosino'ne (Frusino of the Volseians), a town of Italy, 60 miles SE. of Rome by rail, with remains of an ancient amphitheatre. Pop. 7018.

The term frost is used to describe the condition of bodies containing moisture when their temperature is below 32° F., the freezing-point of water. When the substance in question is the air, everything exposed to its influence and not otherwise heated passes also below the freezing-point. In no part of the British Isles, within 1000 feet of sea-level, is the average temperature at any time of the year below 323; and therefore the frosts experienced in Britain, though often lasting several days or even weeks, are essentially sparadic and of the nature of interruptions in the general character of the weather. It may be noted in passing that when severe frosts do occur, covering the rivers and lakes with ice, the weather is usually settled, there being a high harometer and little wind; so that the air over the British Isles or those parts of them where the frost prevails is not liable to be mixed with air from the warmer regions above the seas around. Loch Ness is one of the few lakes in Britain never known to freeze: its great depth prevents the cold having time to cool the whole mass of the water even in the longest and severest frosts that have occurred within the memory of man. Other large but shallower lakes, such as Loch Lomond, on the contrary get sufficiently frozen over to bear skaters and curlers during every exceptionally cold winter. A frequent and disagreeable effect of frost is the bursting of waterpipes, due to the expansion of water in the act of freezing. The breakage is not usually noticed till a than sets in and the water again eirenlates in the pipe, hence it is sometimes erroneously supposed that the thaw has burst the pipe.

Local low temperatures are often found in valleys when the air at a little height up is considerably warmer, producing what is known as an 'up-bank thaw.' This is caused by the air chilled by radiation from the sides of the hills settling dawn from its greater weight, and occurs on every night when there is not enough wind to mix the different layers together. In fact, on calm mornings a stream of cold air flows down valleys like their rivers, and often indicates its presence by the fog caused by its coming in contact with the damp air above the watercourses. In choosing sites for houses or gardens a less liability to great cold and damp fogs will be secured by placing them on knolls or a little up the sides of the hill than if they are planted in the bottom of the valley, and thus in the influence of this cold current. A position directly opposite the mouth of a valley is also to be avoided.

Frost may be present on the ground or on plants when the air is several degrees above the freezingpoint. This hoar-frost is due to cooling by radiation (see RADIATION)—i.e. to the ground, leaves,
&c. radiating their heat away faster than it can
be replenished from the air around. Hoar-frost is
most liable to occur on clear nights, clouds acting
as a screen to eheck radiation, and is more common
in country districts than in towns, where the smoke
serves a similar purpose. It is the frost most
dangerous to vegetation—coming as it does in clear
weather when the air is otherwise warm, the days
often hot from strong sunshine, and the tissues of
the plants full of sap. It may sometimes be foretold by observing the hygrometer; if the dew-point
(see Dew) is below 32° in the afternoon, hoar-frost
may be expected at night. At the same time it is
frequently a sign of warm days, as the low dew-point
indicates that little moisture is present in the air to
check the sun's rays. Hoar-frost being wholly due

to radiation, it is a common custom to protect plants by spreading some light covering over them, or even by burning leaves, brushwood, &c. to make a smoke of sufficient density to act as a screen. This is usually effectual, but may fail either from the air cooling below 32°, in which case the covering is almost uscless; or by injuniously checking the circulation of air and confining a small quantity immediately over the plants, which, getting cooled by contact with the ground below the temperature of the free moving air around, may pass below 32° and allow the vegetation to be frost-bitten.

A well-known form of frost, closely allied to hoarfrost, is the crystalline deposit seen when the moisture in the air of a warm room condenses on the glass of the window. It takes most beautiful and varied forms, owing to the tendency of ice deposited in this manner to form hexagonal crystals.

Another form of deposition is fog-crystals, which appear whenever a frosty fog is accompanied by wind, the fog drifting along and depositing spientes of ice on all surfaces exposed to it. As frosty fogs in low-lying districts occur usually in calm weather fog crystals are not often observed there, but are of frequent occurrence on hills, where the driving mists cover all projecting stones, trees, &c., with great masses of loose feathery crystals, often reaching a thickness of several feet. Great dunage is sometimes caused to trees and shrubs by rain falling immediately after frost, before the ground and the air near it has time to thaw. The rain freezes as soon as it touches any objects, and gradually encrusts them with solid ice, until even large branches of trees break down under the weight. For other matters connected with freezing and its offects, see ICE, TEMPERATURE, THERMOMETER, GLACIER, HAIL, SNOW, FREEZING MIXTURES, &c.

Lists of the most memorable frosts on record will be found in W. Andrews's Famous Frosts and Frost-fairs in Great Britain (1887), and in C. Walfard's paper on 'Famines' in Journal of the Statistical Society (1878). Fairs were held on the ice on the Thanes in 1564, 1607-8, 1620, 1688-84 (especially celebrated), 1688-89, 1715-16, 1739-40, 1788-89, 1813-14. The western parts of the Baltic were frozen, and in most years passable for men and horses, in 1294, 1296, 1306, 1323, 1349, 1402, 1459-60, 1548, 1658, 1767. Flanders and Holland were visited by musually severe frosts in 1468, 1544, 1565, 1594, 1622, 1734, and 1785. Besides these, other memorable frosts occurred in the years and countries mentioned in the subjoined table:

```
401, 763-4. Seas near Constantinople.

859-60. Mediterranean and Adriatic.

1035. On Midsummer Day in England.

1076-77. England.

1234. Mediterranean.

1420. Sea near Constantinople.

1433. Germany.

1420. Sea near Constantinople.

1433. Germany.

1420. Hellespont.

1434. Gentral and North Europe.

1783-84. Central and North Europe.

1783-84. Central and southern Europe.

1812. Russia.

1815. Camada.

1849. Norway.

1873. France.

1873. France.

1873. France.

1873. Blizzard (q.v.) in U.S.
```

Frost-bite is eaused by cold depressing the vitality of a part or the whole of the hody. The frost-bitten part is at first blue and puffy, from the current of blood through it being much retarded; then, should the cold be continued, it becomes pallid, and the painful tingling gives place to munbuess and insensibility, and finally to actual death or mortification, with a dark livid appearance of the part. Although a sudden violent application of cold may cause death of the tissues, by reducing the temperature to a degree incompatible with animal life, the most common cause of the destructive effects of frost-bite is undoubtedly the excessive

reaction which occurs on sudden removal of the cold, or the application of heat; this is especially

the case with moist cold.

Baron Larrey believed that 'cold was merely the predisposing cause of frost-bite, and mentions that after the battle of Eylan the French soldiers did not experience any painful sensations during the severe cold varying from 10° to 15° below zero of Reanmur's thermometer; but, when the temperature rose from 18° to 20°, they felt the first sensations of cold, and applied for succour, complaining of acute pains in their feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of a dull red colour. In some cases, a slight redness was perceptible ahout the roots of the toes, and on the back of the foot; in others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried.' Those of the men who indulged in the warmth of the bivouae fires suffered from frosthite in much larger proportion than their more hardy connades. But the extent of disaster from this cause even in modern campaigning may be judged from the fact that in the French army before Sebastopol 2800 cases occurred in two nights, and of this number 900 subsequently died.

In Great Britain cases of frost-bite are comparatively rare. Occasionally, in severe winters, cases present themselves at the hospitals in the persons of houseless, ill-nourished nufortunates, whose constitutions have in many instances been enfeebled by

spirit-drinking.
The treatment of frost-bite consists in coaxing back by degrees the vitality of the part; this is most prudently effected by rubbing the part in a eold room, at first with snow, then with water at ordinary temperature, and when warmth returns by enveloping it in cotton-wool or finnel without applying heat. As the coldness subsides, the painful tingling returns, then redness and heat; in a short time the latter will be above the natural standard, and, if the reaction is severe, the part will

inflame, and perhaps mortify. It is well to remember that the part need not have been actually frozen for these symptoms to occur. The person with The person with languid eirculation who, coming home with cold wet feet, places them before the fire, or in warm water, may be 'frosthitten' to all intents and purposes.

Froth-fly, also called FROTH-HOP-PER, FROG-HOPPER, FROG-SPIT, common names for numerous insects parasitic on plants, on which the larvæ and pupæ are surrounded found by a frothy spittle. They are included in the family Cicadellidæ in the order Homoptera, and are related to the Aph-ides, Cicadas, and Lantern-flies. The Lantern-flies. family is a very large one; the members

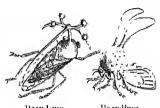


Frog-hopper (Aphrophora spumaria): a, larva; b, perfect insect, with wing-covers closed; c, perfect insect, in the act of flight; d, the froth on a

are all plant parasites, mostly small in size, often 210

very beautiful in form and colour, The young stages, which are very like the adults, except in the absence of developed wings, suck their plant hosts, and thereupon surround themselves with the familiar froth which issues from the bind end of the gut. The froth is popularly called enckoo-spit or frog-spittle, from fancies entertained as to its origin. It is sometimes so alundant, on willows for instance, that it drops from the branches. In some cases it may be helped by an exudation from the wounded plants. The adults have long hindlegs, and are able to hop about with some activity. The commonest British species, Aphrophora spumaria, is a yellowish-green insect, towards half an inch long, particularly addicted to willows; another com-

mon green Tettiform, viridis, gonia prevalent nicadows; guindenta, in red and black, also occurs; while Typloeylia, Jassus, and Ledra are



Bocyduun ernciatum.

Locydium globulare.

and Ledra are abundantly represented in Europe. In tropical countries the Cicadellidæ are still more plentiful and beautiful. The nearly-related family Membracidæ includes many most extraordinary insects (see fig.)—e.g. in the genera Bocydium and Centrotus, with bizarre outgrowths from the first segment of the thorax.

Froude, JAMES ANTHONY, an eminent English Fronde, James Anthony, an eminent English historian, was born at Dartington, near Totnes, Devonshire, 23d April 1818. The youngest son of the Archdeacon of Totnes, he was educated at Westminster and Oricl College, Oxford, took a second-class in classics in 1840, and in 1842 was elected a Fellow of Exeter College. He took deacon's orders in 1844, and was sometime under the spell of Newman's influence, but ere long his opinions underwent a fundamental change, as revealed to the world in 1843 in his outspalers hook. opinions unleavened a intransical energy as realed to the world in 1848 in his outspoken book, The Nemesis of Faith, a work in which the solemnity and sadness of religious scepticism are relieved. by a singularly tender and earnest lumanity. book was written with great and even startling power, and not only cost Froude his fellowship, but also an educational appointment in Tasmania. For the next few years he employed himself in writing for Fraser's Magazine and the Westminster Review, History of England from the fall of Wolsey to the defeat of the Spanish Armada, completed in 12 vols. in 1869. In this work Fronde shows supreme literary ability—no reader can ever forget his narrative of the death of Mary Stuart and the disasters that befell the great Armada. In the art of making history as fascinating as fiction Macaulay is his only rival. But like him he is a man of letters first and an historian afterwards, and the defects of his merits have sadly impaired and the defects of his marks have sain impared the permanent value of his work. As has been said with truth, he taught himself history by writing it; still his use of his materials never becomes critical, and his views of men and motives becomes critical, and his views of men and motives are always distorted by being seen through 19th-century spectacles, and these, noteover, spectacles of his own. Natural love of paradox and the faculty of seeing easily what he wished to see helped him to make a hero of Henry VIII.—the greatest blot upon his history. Four volumes of remarkably brilliant essays and papers, entitled Short Studies on Great Subjects, appeared between 1867 and 1882. Froude was elected rector of St

Andrews University in 1869, and received the degree of LL.D. For a short time he was editor of Fraser's Magazine. His next history, The English in Ireland in the Eightconth Contury (3 vols. 1871-74), showed the same merits and the same defects as the greater work, and the same may be said of his Casur: a Sketch (1879), a subject for the treatment of which he possessed but one qualification—consummate style. In 1874, and again in 1875, Fronde visited the South African colonies on a mission from the home government, and published his impressions in Two Lectures, South African 1899. tures on South Africa (1880). As Carlyle's literary executor, Fronde edited his Reminiscences (1881), Mrs Carlyle's Letters (3 vols. 1882), and Carlyle's own Life (4 vols. 1882-84); and by giving to the world the conious personal criticism and family details contained in these works, he suggested grave doubts as to his editorial discretion. Later grave doubts as to his entorial discretion. Later works are Oceana (1886), a delightful account of a voyage to Australia and some of the Pacific Islands, English in the West Indies (1888), and The Two Chiefs of Dunboy (1889), an historical ronance of Irish life towards the close of the 18th century. The first two were violently assailed by century. The first two were violently assumed by colonial journalists as pictures rendered authorithful and misleading by the personal hias of the writer.

—His elder brother, Richard Hurrell Fround, a leader in the Oxford Tractation movement, was born at Dartington, in Devonshire, 25th March 1803. After graduating at Oxford in 1824 he became Fellow and tutor of Oricl College.

Tracts 9 and 63 were from his year. He dieder. Tracts 9 and 63 were from his pen. He died on 28th February 1836. His Romains were published three years after his death by Keble and Newman. Another brother, WILLIAM FROUDE, engineer and mathematician, born in 1810, and educated at Westminster and Oriel College, Oxford, was trained to be a civil engineer, and in 1838 became assistant to Brunel. Retiring from professional work eight years later, he devoted most of his time themselvered down to his cleanly at the Charlestown of the state of the control of the state of the state of the control of the state of the st thenceforward, down to his death at the Chipe, 4th May 1879, to investigating the conditions of naval construction and the laws upon which the motions of vessels at sea depend-i.e. he sought to determine the laws of wave-resistance, of marine propulsion, the rolling of vessels, effects of deep hilge keels, and the best forms of rudders and propellers.

Frozen Strait, a passage, about 15 miles wile, separating Southampton Island, in the north of Hudson Bay, from Mclville Peninsula.

Fructidor (Eng., 'fruit-month') was the name given in the republican calendar of France to the period extending from the 18th of August to the 16th of September (see CALENDAR). The 18th Fructidor of the year 5 (4th September 1797) is celebrated as the day on which a coup a tat on the part of members of the Directory (arch event the part of members of the Directory (q.v.) saved the republic from the machinations of the royalists.

Fructification (Lat., 'the producing of fruit'), a term frequently employed in botany, especially of cryptogams, sometimes to denote the whole reproductive system, and sometimes the 'fruit' itself. See Fungi, Seaweeds.

Fructose, or Fruit-Sugar. Sec Sugar.

Frugoni, Carlo Innocenzo, an Italian poet, was born at Genoa in 1692, and taught rhetoric at Brescia, Genoa, and Bologna, and died in 1768. He belonged to the 'Arcadian' group, and wrote odes, epistles, and satires, and was famous with his contemporaries for penetility and december but his contemporaries for versatility and elegance, but is now all but forgotten.

Fruit. In popular language, the term fruit is very vaguely employed. When extended beyond the common limitation of usefulness to man or beast, it tends to be applied to any plant-structure,

phanerogamic or cryptogamic, which contains the germ of the new individual--to all the organs of fractification in short. But, as common observaally led to the more precise restriction of the term frait to the ovary of angiosperms (monocotyledons or dicatyledons) after tertilisation (see Franker, Ovary).

The namerons and interesting adaptations of different fruits to the preservation and distribution of the seed will be more conveniently outlined under SEED, while the periodic rhythm between vegetative and reproductive growth to which the question of fruit attracts our altention must be discussed under the more general head of Re-PRODUCTION. The special structure and physiology

of fruits here remain to be considered,

Since the dawn of modern botany, the multifarious forms of finit have led to many attempts at their classification. Yet the student is more upt to be overwhelmed by the resulting disorderly and redundant nomenclature of the subject than impressed by its systematic eleanness. It, havever, we keep fast hold of the elementary conceptions of vegetable physiology, morphology, and evolu-tion, the difficulty of enumerating and classifying the various forms of fruit becomes greatly diminished. We must of course assume a knowledge of

starbing then with those simplest flowers in which all the curpels are separate, we find the stigms and style usually withering back as no longer of service, and the overy enlarging, as the fertilised ovules grow up into seeds. But in many such simple flowers more agules are produced than are fertilised, and generally also more fertilised than can be developed up to maturity; hence the reduction of the ovules is exceedingly common. The alternative of reducing the number of earpely also commonly appears : hence in the same order of Ranunculacem we have on the one hand the memorie with its multitude of small ovaries which only mature a single ovale, and on the other the lack spur or mankshood with few earpels, but these many-seeded. This process of reduction of the number of carpels or ovules, or of both, has not only taken place in the process of past evolution of the great majority of plants, but is still frequently to be observed in the development of the individual, as is well seen by comparing the characteristically one-celled and one-seeded acorn with a section of the three-celled and six-nouled away from which it actually arose in spring, or, more simply, by recalling to memory the abortive ovules and the corresponding abortion of one or two of the original three divisions of the overy in the fruit of the horse-chestunt.

A second common sense 'principle of femit-making,' as we may call it, is reached through keeping clearly in mind the nature and origin of the every; for, however the apgrowth of the axis may in herigynous or epigynous flawers concent this (see Flower), we know the overy primarily to have a right from the every firm one or more accordance between families. arison from one or more carpellary leaves, of which the individual development has been so greatly checked (doubless through the praceious development of their sportingia- i.e. ovules), that so far from becoming expanded like all other appendages, they romain closed upon the ovules, and frequently even conlesce with each other from the base upwards, so forming a many-celled overy, often even with united styles or even stignus. Yet the tendency to their individual expansion is not lost; in many monstrosities, and normally a few types, such as the common mignonette, the curpellary leaves early begin to expand, so opening the overy and exposing the seeds long before ripeness. For more frequently, however, this final development of the

FRUIT

carpellary leaves is delayed until the growth-processes of the seed and fruit have ended, and it is therefore accompanied, or even preceded, by their death; the separation often indicating the lines at

once of leaf-margin and leaf-fall.

In the best developed carpellary leaves, such as those of the more floral Rammenlaccae, we natursubstitute of the covery 'deliseing along the ventral suture'—in more simple and less empirical language, the carpellary leaf opening along the line of its muited ovule-bearing margins, This is what

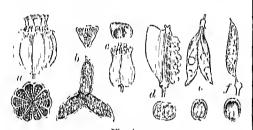
is termed a follids (fig. 1, f).
Since, however, the ovules are on the united margins, the midrib tends to become mechanically unimportant, and to interpose little or no resistance to a tendency to split or tear along its fold, as well as to open along the united margins. Such 'dehiscence by both dorsal and ventral sature' gives us the modification of the follicle known as a

gives us the modification of the former known as a legiume or pod (fig. 1, c).

A very familiar type, which must not be confused with the pod, is the siliqua (or when shortened and broadened the silicula) of Crueifers. Here the placental edges of two united carpels develop a transverse septum which divides the fruit (fig. 1, d); and this is left when the lobes split away, as so familiarly in Hanesty.

familiarly in Honesty.

Among united ovaries which readily split open at the mitted margins (septicidal) we may note that of (lentim (q.v.), while the more familiar three-colled overy of a violet (fig. 1, b) or rock rose with its parietal placentation gives a characteristic example of dehiscence along the midribs of the united carpels, so opening the heali (locali-cidal). In the five-celled capsule of the Geranium cidal). In the five-celled capsule of the Germinu (q.v.) the carpellary leaves separate not only at the



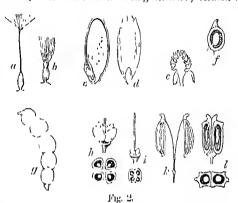
f, fallicle; e, legume; d. silicula; e, capsule of heubane; b, of violet; a, of poppy.

sides but also at the base, so curling inwards and projecting the seed. In Colchicum, white bellebare (Veratrum), and their allies (Melaulhacew) the dehiscence is characteristically septicidal, the earpels separating instead of the locali opening; the remaining majority of Liliacew are localicidal. Where, however, the placentic remain more or less completely upon a central column from which the valves are detached, the deliscence is said to be

septifragal.

In henbane (fig. 1, c), Anagallis, &c. the dehiscence is circular (circumscissite); the possible explanation of this as a disarticulation of the united carnels by their leaf-bases is, however, rendered difficult through the separated portion being a mere Many-celled capsules are numerous in which the lenf-opening or debiseence is greatly reduced from completeness, witness the ralvular and porous dehiscence of the Lychnis and of the poppy (fig. 1, a) respectively. Such cases clearly point us to those of carpels which do not open at all. Such indehiscent fruits, produced from earpels so persistently embryonic, are, as we might expect, usually short, few or one ovuled, and, for the most part, little specialised. Thus the folliele of the Rannaculacere of more specialised floral character becomes

shortened into the one-seeded indeliseent achene of the anemone or butterenp (fig. 2, c, f). In the acheme of the grasses (which similarly represents the capsule of the ancestral likes) the thin dry pericup becomes inseparable from the seed-coat (hence the term caryopsis, fig. 2, c, d); in many trees (e.g. hazel) it becomes hardened and thickened as a nut. In composites (fig. 2, u, b), too, the achene is practically a nutlet, although aften (on account of its being inferior) termed a



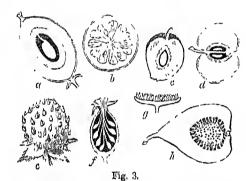
, fachenes of but terenp; c,d, on yops so foat; a,b, achieves with pappus; a, bonentam; b,b, nutlets and every of borage; b,b, numbeliherous type of schlaggarp.

cypschi. Less extremely reduced representatives of the various multicellular ovaries to which such fruits correspond are afforded us by borages or labiates, in which the two-celled ovary of the primithree solutaneous type becomes, as in thorn-apple, &c., subsequently divided into four parts: those (see fig. 2, i, h), however, are here so arrested as only to develop a single ovule in each localus (of which the subsequent growth brings about the perplexing appearance of the 'gynobasic' style). The feur ripe 'untlets' into which the four lobed ovary of these forms commonly breaks up were not nunaturally mistaken by the old botanists for maked teristic form of schizocary, as all such fruits are terined which split up without truly carpellary dehiscence, although the tendency to this can be seen still to have some influence. Here the separate portions (or mericarys), each resembling an achene or unt, are two in number, and when ripe swing off

In exceptional cases we have the pod of some Leguminose and the siliqua of some Crucifers—e.g. radish, snapping off into one-seeded joints, instead of dehiscing longitudinally in the regular way. This simply comes about where the swellings corresponding to the seeds become numerally large, leaving narrowings between them, and thus giving the pod a strength of form too great for the usual tension of riponess to overcome (fig. 2, g). To confuse such distinct types of fruit under a common term (lomentum), and to separate them from the normally deliseent capsules to which they really belong, and to place them among the purely 'schizocarpous' fruits we have been describing, although still too customary, are merely examples of the reasoned mistakes inseparable from a purely descriptive anatomy, but from which the evolutionary standpoint is at length delivering us.

So far all our fruits have been dry; but a new physiological 'principle of fruit-making' is necessary to comprehend those in which the pericarp is succulcut. For, just as the effect of fertilisation is seen in many animals to extend beyond the mere ovum to the parent organism, and also in many of 20 FRUIT

the lowest plants, so it is in the case before us. Even in fruits which are dry on ripening we have seen that the ovaries or locali, on which no demand is made for the growth of fertilised ovules, become reduced or disappear. Sometimes it may be merely the coats of the seed (as in the pomegranate) which undergo the complex histological and chemical changes which we sum up as those of succellence and ripening; at other times largely their placentas, as in the gooseberry and currant. Yet, as in these, the innermost tissue of the ovary may become succulent as well. In the orange also the familiar succulent tissue in which the seeds are immersed are the enlarged succulent cells of the endocarp; the grape too gives a characteristic example of soft endocarp. These may all be classed as herries or baccate fruits, for the distinction of the succulent product of an inferior overy as a herry, from that of a superior one, as a uva or grape, need hardly be allowed to increase our nomenclature. A pepo to merely a berry in which the opicurp is thick and tongh (e.g. a niclon, with which the orange and pomegranate may be reckoned). Where the succulent change, instead of primarily affecting the



n, drupe; b, orange; c, a single drupelet of bramble; d, pome; e, strawberry; f, hip of rose; g, capitulum of Dorstenia; h, fig.

deeper tissues of the fruit, and so producing a berry, leaves the endocarp hard, we have evidently a well-contrasted type—the drupaceous or stone-fruit. The endocarp here forms a more or less complete 'stone' around the kernel or seed, the difference from an ordinary nut being due to the succulence of an outer layer, as mesocarp, with a more or less leathery outer skin, the cpicarp. The plum, peach, and nectarine are the most obvious examples; but, and nectarine are the most obvious examples; but, since we may have many carpels thus transformed, we may have an aggregate fruit or syncarp of tiny drupes. The walnut and even cocoa-nut are hence not true nuts (see Nut). The immature succulent mesocarp of the former is familiar in pickles, the walnut we crack being merely the stony endocarp (which is exceptionally specialised in being set free by the bursting of the mesocarp or ringuing). The (which is exceptionally specialised in being set free by the bursting of the mesocarp on ripening). The familiar cocoa-nut fibre is the fibro-vascular tissue of the mesocarp, the fruit being thus broadly comparable to a peach which has wizened while still young and stringy. But, as in the kindred grass, the coats of the ovule further unite to the endocarp. The numerous carpels of the strawberry, although, of course, corresponding to those of the allied raspherry, remain more nuts, here however, the sub-

of course, corresponding to those of the affect rasp-berry, remain more nuts; here, however, the sub-jacent portion of the floral axis or receptacle becomes succulent. In the perigynous or epigynous Rosaceæ the same change may take place; hence the rose-hip is a succulent axis, enclosing a multi-tude of mits. The apple or 'pome' is more akin to the drupe, since the carpels, here deeply sunk in the uncrown floral axis, develon a hard endocarn the upgrown floral axis, develop a hard endocarp

corresponding to the stone of a drupe.

Fertilisation may even be followed by succulent or other thickening of the floral envelopes, or of the floral axis with subjecent bracts—the various developed at the expense of an entire inflorescence, as in the pine-apple, Porstenia, and fig. See Inflorescence.

Fruits Important to Man.—The list of the fruits of any importance is much shorter than would at first be supposed, as may be seen from the following ennueration (practically that of Frank), which distinguishes those native or cultivated in northern Europe (Germany and Britain) from the more important loveign fruits, and of course employs the terms stone-fruits, berries, &c. in their merely

popular sense.

popular sense.

I. Indigenous or Cultivated: (1) Apples or Pipfruits.—Apple (Pyrus Matus), Pear (P. communis), Medlar (Mespilus germanicu), Quince (Cydonia japonicu), Service-berries (Sorbus terminutis and S. domestica), to which may be added flips (Rosa cania, &e.) and Haws (Cratequs Oxyacantha), also Cornel-berries (Cornus muscula).

(2) Stone-fruit.—Peach and Nectarine (Preside vulgaris), Apricot (Prunus armeniaca), Plum (P. instititia), Cherry (P. Cerasus and P. avium), Damson (P. domestica), Groengage (P. italica), Stoe (P. spinosa), Cherry-plum (P. cerasifera), &e.

(3) 'Berries.'—(Irape (Vitis vinifera), Strawberry (Fragaria vesca, vlatior, &c.), Raspberry (Rubus Ideus), Bramble or Blackberry (R. fraticasus), Gooseberry (Ribes Grossularia), Red Currant (R. rubrum), Black Currant (R. nigrum), Barberry (Berberis vulgaris), Black Mulberry (Maras nigra), White Mulberry (M. alba), Bilberry or Blacherry (Vaccinium Myrtillus) with its union congeners, Juniper (Invinerus communis)

(Vaccinium Myrtillus) with its minor congeners, Juniper (Juniperus communis).

(4) Nuts or Shell-fruit. — Hazel-nut (Corylus Avellana), Filbert (C. tubulosa), Walnut (Juglans regia). See NUTS.

H. More Important Fruits of Warm, Temperate, and Tropical Regions: (1) Stone-fruit.—Date (Phanix dactylifera), Olive (Olca curapau), Mango (Mangifera indica), Tahiti-upple (Spondias duleis), Mombin Plum of West Indies (S. Mombin), Avocado Pear (Persea gratissima), Icaco or Cocoa Plum (Chrysobalanus icaco), Sapota Apple (Achras Sapota).

(2) Berries and Berry-like Fruit (in widest sense of sneculence).—Banana and Plantain (Musa paradisiaca), Pine-apple (Ananassa sativa), Fig (Figus Carica), Bread-fruit (Artovarpus invisa and integri-Carica), Bread-fruit (Artocarpus invisa and integrifolia), Custard Apple (Anona squamosa, &c.), Baobab (Adansmia digitata), Orange, Lemon, Lime, Citron, Shaddock, Pompelmooro, Forbidden Fruit, Berganot, and other species of Citrus, Pomegramate (Punica granatum), Guava (Psidium piriferum), Rose apple of East Indies (Jambosa domestica and rudgaris), Tamarind (Tumarindus indica), Caroh or Locust Bean (Ceratonia siliqua), Papaw (Cartea Papaya), Pumpkin (Cuembita Pepo, &c.), Melon (Cuembi Melo), Water-melon (C. Citrullus), Chemmber (C. sativus), Tomato (Lycopersicum esculentum), Lotus (Diospiros lotus), Jujube (Zizyphus rudgaris), Mangostem (Garcinia Mangostana), Prickly Pear (Opuntia nulgaris).

(3) Nuts or Shell-fruit.—Gocoa-mit (Cocos nucifera), Almond (Anygulalus communis), Chestnut

(3) Muts or Shell-fruit.—Cocoa-mut (Cocos nuci-fera), Almond (Amygidalus communis), Chestmut (Castanca vesca), Litchi or Lee-chee (Nephelium Litchi) (really, however, a shelled drupe), Brazil-nut (Bertholletia excelsa), &c. Chemical Composition of Fruits.—Our knowledge of the chemistry of fruit may be dated from the analyses of Fresenius (1857). But because of the innunerable varieties of almost every cultivated innumerable varieties of almost every entitivated fruit, the effects of different soils and climates

upon these, and still more of the fluctuation due to better or worse seasons, the results of any one chemical analysis would tend to convey an one chemical analysis would tend to convey an idea of nudue precision. Thus—e.g. while the ratio of sugar to free acid in certain grapes of an ordinary wine-year was found to be 16 to 1, in a very bad year it sank to 12, and in a very good year rose to 24. Hence a broad outline may be of more general use than the statistics

of any one analysis.

The percentage of water may be taken as varying from 78 to 80 in the grape and cherry, as from 82 to 85 in plums, peaches, apples, and pears, as 82 to 87 in brambles, currants, &c., and as much as 95 in the water nuclou. The proportion of insoluble residue—skin and cellulose, stone and seed—obviously also varies greatly with succulence and ripeness, but may be taken, one fruit with another, at not less than from 4 to 6 per cent. Unripe fruits may contain a notable proportion of starch, but this is fermented on ripening into glucose and other sugars, fruit-sugar, grape-sugar, cane-sugar, or (in Sorbus) sorbin. The only fruits which retain starch in important quantity are those of the banana, bread-fruit tree, and baobab; hence the exceptional nutritive value of these. The olive alone yields a notable proportion of oil. The proportion of sugars varies execedingly, dates, dry figs portion of sugars varies exceedingly, dates, dry figs (48 per cent.), and raisins (56 per cent.), again very important foods, heading the list. Grapes of course stand high, from 12 to 18, indeed sometimes as much as 26 per cent., cherries from 8 to 13, apples 6 to 8, pears 7 to 8, plums 6, red currants 4.75, greengage 3.5, peach and apricot only 1.5. The proportion of pectin bodies is, however, exceedingly notable, especially in fruits such as the three last manned. In unripe fruits (as also in roots) we find pectose, a body apparently related to cellulose, but easily transmuted by a natural ferment or by boiling with dilute acid into pectin, C₄H₆O₄, and its allies. These are all more or less soluble in water, with which they readily form a jelly (whence the peculiar consistreadily form a jelly (whence the peculiar consistency of our fruit-preserves). The proportion of soluble pectin and gum varies considerably and is of great importance to the blandness and agreeableness of fruit, the harder and more common apples having considerably less than 3 per cent. and the best rennets nearly 8. The harsh red currant, indeed, like berries in general, has exceedingly little (0.25 per cent.); while the apricot has as much as 9, the greengage 12, and the peach has as much as 9, the greengage 12, and the peach 16—a circumstance which explains the peculiarly melting quality of these fruits, especially the last named. The free acid also varies greatly, from 24 per cent. in the red currant, 1 4 in the raspberry, and nearly as much in the sourest cherries, to 0.5 in sweet cherries and a minimum of 0.1 or less in the sweetest pears. That of apples and of grapes, of course, varies greatly, but both may generally be taken at from 1 to 0.75, while the apricot and peach stand at 0.3 or 0.4. The acid is primarily malic, but citric, acetic, oxalic, tannic, and others may also be present.

The quantity of albuminoids is of course small, in fact inadequate to render most fruits a staple

in fact inadequate to render most fruits a staple food. Yet it is by no means mappreciable, ranging rrom nearly 5 per cent. in the majority of fruits to 7 or 8 in the grape (2.7 in raisins), and above 1 in the melon and tomato. Hence to acquire albuminoids equal to those of one egg we must eat 1½ lb. of grapes, 2 lb. strawberries, 2½ lb. apples, or 4 lb. pears. To replace 1 lb. starch = 5½ lb. potatoes, we need 5.4 lb. grapes, 6.7 of cherries or apples, or 12.3 of strawberries (see Food).

The quality of fruits depends largely upon the from nearly 5 per cent. in the majority of fruits to

The quality of fruits depends largely upon the proportion of sugar, gum, and pectin to free acid, largely also upon the proportion of soluble to insol-

nble matters, but in very great measure also upon the aroma. This quality is due to the presence of the aroma. This quality is due to the presence of characteristic others, often accompanied by essential oils, although not of course in ponderable percent-Cultivation and selection operate strongly on

all three factors.

Keeping of Fruit.—Many of the finest fruits undergo very speedy decomposition, which, as distinguished from the intrinsic processes of ripening, is due to the attacks of hacteria, moulds, or ing, is due to the attacks of bacteria, moulds, or yeasts; and the problem of their preservation is therefore primarily one of preventing these. In damp and stagnant air, especially with considerable or frequent changes of temperature, these fungus pests multiply with special readiness; hence a fruit-room must be cool and shady, yet dry and airy, and the fruit carefully gathered rather before full ripeness, handled so as to avoid in any way bruising or tearing the skin, and laid out and occasionally looked over so that rottenness in one may not affect the rest. Under these conditions apples especially may be kept for these conditions apples especially may be kept for many months; indeed many varieties of fruit—e.g. winter pears-require these conditions for satisfac-On antiscptic principles we see how tory ripening. it is that the dense-skinned and wax-coated grape to is that the dense-skinned and wax-coared grape can be so largely imported in sawdust, or how unripe gooseberries, and even very perishable pears can be kept for months similarly packed in well-scaled jars in a cool place. The process of preserving with sugar in jars promptly covered up is similarly an antiseptic one; but in the systematic application of antiseptic one; but in the systematic approach of antiseptic principles we may still look for considerable progress in the preservation and transport of fresh fruit upon a large scale. The method of drying fruit has also been in use from remote times, especially with dates, figs, and raisins; in America the drying of apples is of great and increasing investors.

importance.

The preparation of fruit-preserves is separately treated (see PRESERVES); and similarly that of fermented beverages (see WINE, CIDER, &c.). For Fruit Gardening, see GARDENING and the articles on the several fruits.

FRUIT TRADE.—The annual imports of fresh and dried fruits into Britain are very extensive, as may be seen from the table below for 1887. The items in the first part of the table are free of duty; but currants, raisins, figs, plums, and prunes pay a duty of 7s. per cwt.:

Oranges and lemons		4,507,500	ndanera	1 . 54.	L, D40,001
Unenumerated: Raw		2,478,101	n	,, :	1,166,318
ıı Dried		898,469	cwt.	• •	336,929
n Preserved v	with-				
out sugar	2	20,820,073	lb.		187,216
_					•
Currants.,		1,100,737	cwt.		1,488,320
Raising			17	., :	1,022,402
Figs and fig-cake			11	٠.	166,961
Plums			11		78,409
Prunes					21,830

Large and varied as is the produce of fruit in the United States, the imports are an important item of commerce. The duty-free fruits and nuts, mainly United States, the analysis of commerce. The duty-free fruits and nuts, manny bananas and eocoa-nuts, had in 1887 a value of \$4,767,659. In the same year the total value of imported fruit and nuts paying duty was \$15,088,074; currants (29 million lb.), figs, lemons, oranges, plums and prunes (70 million lb.), preserved fruits, raisins, almonds, filberts, and walnuts falling into this category. The value of orchard products in this category. The value of orchard products in the United States in 1880 was \$50,876,154; and the same year the value of canned and preserved fruits prepared for sale in the States was \$17,600,000, besides very large quantities similarly preserved for home use.

Fruit-pigeon (Carpophaga), a genus of pigeons, including about fifty species, distributed over the whole Australian and Oriental regions,

but much more abundant in the former. They live in forests, are well adapted for arboreal life,



Fruit-pigeon (Carpophaga occanica),

and feed on fruits. The gape is wide; the colouring of the plumage brilliant. The term fruitpigeon is also extended to members of other genera—Treron, Alectronas, &c. See PICEON.

Frumentius, ST, a postle of Ethiopia and the Abyssinians, born in Phomicia to-wards the beginning of the 4th century. At a very early age he and another youth, named Edesius, accompanied their nucle Meropius on a voyage undertaken for mercantile purpuses,

and they landed on the coast of Alyssinia or Ethiopia to procure fresh water; but the savage inhabitants made an onslanght upon them, and murdered Merquins and the whole crew, sparing only the two boys. They were taken as slaves into the service of the king, and made themselves so beloved that Ædesius was soon raised to the office of cuplearer, while Frumentius became the king's private secretary and instructor to the young prince, obtaining great influence in the administration of the state affairs. He aided the Christian merchants who sought these parts in founding a church, and gradually paved the way for the formal introduction of the new creed. In 326 he went to Alexandria, and was by Athanasius consecrated Bishop of Axum. The new bishop repaired to Abyssinia, and succeeded in proselytising large numbers. He is also supposed to have translated the Bible into Ethiopian (see Ethiopia). Frumentius died about 360.

Framenty, or Furmery (Lat. framentum, 'wheat'), an English dish made of whole wheat or rice boiled in milk and seasoned.

Frundsberg, Geong von, the great leader of the German landsknechte during the Italian wars of the emperors Maximilian and Charles V., was born in 1473 at Mindelheim in Swabia, and there he died in 1528. He fought in twenty pitched battles, besides sieges and skirmishes without number; and the victory of Pavia (1525) was largely due to him. Two years later he was marching on Rome with the Constable de Bourbon, when a mutiny of his soldiers brought on a stroke of apoplexy. See monographs by Barthold (1833) and Heilmann (1868).

Frustum, in Geometry, is the part of a solid next the base, left on enting off the top by a plane parallel to the base. The frustum of a sphere or spheroid, however, is any part of these solids comprised between two circular sections; and the middle frustum of a sphere is that whose ends are equal circles, having the centre of the sphere in the middle of it, and equally distant from both ends.

Fry, ELIZABETH, born May 21, 1780, was the third daughter of John (turney, Esq., of Earlbann Hall, near Norwich, a rich banker, and a member of the Society of Friends. Her mother died when she was twelve years old, leaving four sons and seven daughters. The sisters grew up attractive and original. They dressed gaily, and saug and danced.

Till Elizabeth was eighteen she had no decided religions opinions. In February 1798 a discourse she heard in the Friends' meeting-house at Norwich by William Savery, an American Friend, made a deep impression on her, and led her to wish to become a 'plain Friend.' From this time her In February 1798 a discourse natural loving cute for others was greater than before. She worked much among the poor, and began a school for poor children, which she managed entirely herself, even when the number of scholars increased to more than seventy. In August 1800 she married Joseph Fry, of Plashet, Essex, then engaged in extensive business with his brother in London. She lived with her husband in his house of business, St Mildred's Court, City of London, till 1809, when, on the death of her fatherin-law, she removed to Plashet. Five children were born to her in London, and six more at Plashet. In 1810 she became a preacher among the Friends. In February 1813 she visited Newgate for the first time, and say 300 yomen, tried and nutried, with their numerous children, without omplayment, in an almost lawless state, crowded together in rags and dirt, with no hedding, and nothing but the floor to sleep on. She could do no more then than supply them with clothes, but, within a few years, by her efforts, a school and within a few years, by her efforts, a school and a manufactory were established in the prison, a Ladies' Association was formed for 'the improvement of the female prisoners,' religious instruction was regularly given to thou, a matron was appointed, and the women willingly submitted to rules for their well-being. Prison reform now became one great object of Mrs try's life. She visited prisons in different mate of the kingdom. visited prisons in different parts of the kingdom and on the Continent, and introduced many improvements in their management and discipline. She also did a great deal to improve the condition of the found consists and approved. of the female convicts sentenced to transportation. Through her influence libraries were begin in the naval hospitals and the constgnard stations, and Bildes were supplied to them. She died at Rams-gate, October 12, 1845, and was buried at Barking, Essex. Mrs Fry was a true-hearted, loving woman, peculiarly gifted for the difficult work she had to ob by her sympathy, her great power of understanding, quickness of perception, tact, and alarm of manner. See the Life by her daughters (2 vols. 1847), and the shorter one by Mrs Pitanin (1881).

Frying. See BOILING, COOKERY, FOOL

Fryxell, Anders, a Swedish historian, was born 7th February 1795, at Hesselskog in Dalsland; studied at Upsala, took priest's orders in 1820, and in 1828 hecame rector of a gymnusium in Stockholm. From 1835 to 1847 he was parish priest of Sunna in Vermland, and from this latter year he devoted himself entirely to literary pursuits till his death at Stockholm, 21st March 1881. His reputation rests upon Berittelser are Svenska Historica ('Narratives from Swedish History,' 46 vols. Stockh. 1832-80). These narratives, largely biographical in form, and distinguished by their impurtial love of truth, soon obtained a wide popularity in Sweden. Parts of them have been translated into almost all European languages (Eng. trans. edited by Mary Howith, 1844). Another work, Conspiracies of the Swedish Aristocracy (4 vols. Upsala, 1845-50), was intended as a reply to the accusations urged against that class by Geijer and others, and involved Fryxell in a keen controversy with the democratic liheral party in Sweden. Besides these works he wrote a Contribution to the Uistory of the Literature of Sweden (9 vols. 1860-62). Fryxell also laboured, both by his own example and by the publication of a Swedish Grammar, to purify his mative language from the parasitism of foreign words.

Fuad Pasha, Mehmed, a Turkish statesman and litterateur, was born at Constantinople, 17th January 1814. He was the son of the celebrated poet, lzzet-Mollah, and had already begun to make himself known as an anthor, when the exile of his father, who had fallen into disgrace with the Sultan Mahmud, compelled him to choose a profession. He studied medicine, and for some years was Admirally physician, but in 1835 abruptly forsook medicine, and employed himself in the study of diplomacy, history, modern languages, the rights of nations, and political economy. In 1840 he became first secretary to the Turkish ombassy at London, and in 1843 was at Madrid. It was almost impossible to helieve him to be a Turk, he spoke French so marvellously well. On his return to Constantinople he was appointed to discharge the functions of grand interpreter to the Porte, and in 1852 became minister of foreign affairs. On the question of the 'Holy Places,' Fuad Pasha, by his attitude, and by a brochure very hostile to the pretensions of Russia, gavo great dissatisfaction to the caur. In 1855 he received the title of Pasha, and was again appointed minister of foreign affairs. From 1861 to 1869 he hold the office of Grand Vizier. He died in 1869. To him especially it is said Turkey owes the hatti-sherif of 1856. See Turkey.

Fuca, or Juan de Fuca, Strait, a passage separating Washington Tenitory from Vaneouver Island, and connecting the Pacific Ocean with the Gulf of Georgia. It contains several islands, one of which, San Juan, became the subject of a dispute between Great Britain and the United States, the question being whether it was to be regarded as an appendage of Washington Territory or of British Columbia. In 1872 the emperor of Germany, as arbiter, decided that the line of boundary should be run through the Strait of Haro, west of San Juan, thus awarding that island to the United States; and it and several neighbouring islands now form a county of Washington Territory, with a population of 948.

Fû-chan. See Foochow.

Fuchsia—named in 1703 by Plumier after Leonhard Fuchs (1501-66), who with Brunfels and Bock (see BOTANY) was one of the founders of German botany—a genus of Onagraceæ containing



a, Fuchsia Riccartoni; b, a garden variety.

about fifty species, small shrubs or trees, natives of the Pacific coast of South America, whence a few have ranged northwards to Central America, and others to Now Zealand. The usually pendulous flowers are of characteristic appearance and often striking beauty; they are very easily propagated by cuttings and grow freely, especially near the seacoast. Some, notably F. discolor and F. Riccartoni, are capable of withstanding our winter so well that fuchsia-hedges are a common ornament of gardens on the west coast of Scotland. Others can be treated as herbaceous plants; and most if not indeed all will flower well in the open air during summer. Cultivators recommend keeping back plants, so that when planted out in May they shall only then begin to put out their leaves. The commonest species is usually known as F. coccinea (but is said to be only a variety of F. globosa, and this again of F. macrostemma, while the true F. coccinea, with nearly sessile leaves, is rare); F. conica, corallina, fulgens, gracilis, &c. are also well known, as well as the hardier species above named, while the floists' varieties and hybrids are immunerable. There are also many dwarf species of characteristic habits. The berries of many species are eaten with sugar in their native countries, and when they ripen are occasionally preserved even here. The wood of some species is also employed in South America as a black dye.

Fuchsine. See Dyeing.
Fuchs's Soluble Glass. See Glass, Soluble.

Fucino, Lake of, or Lago di Celano (ancient Fucinus Lacus), a lake of Italy, in the province of Aquila, with an area of 61 sq. m., is situated 2172 feet above sea-level. Being only 75 feet deep and laving no constant outflow, it was subject to sudden risings, which on more than one occasion immedated the surrounding regions. To obviate this danger the Emperor Claudins cut a subterranean channel, nearly 3 miles in length, through the solid rock of Monte Salviano, 30,000 men being engaged in the work from 44 to 54 a.d. This tunnel, however, soon became obstructed and long remained so, notwithstanding various attempts to clear it. As the lake had been steadily rising from 1783, a new canal was made (1852-62) by the Swiss engineer De Montricher. By 1875 the lake was dry; it is now under cultivation.

Figures, the generic name of the various species of brown sea-wrack which form the main vegetation of rocky shores between tide-marks. Commonest of all upon European coasts (savo in the Mediterranean), and abundant also in the North Pacific, is F. vesiculosus (Bladderweed, Black Tang, Seaware, Kelp-ware, &c.), easily distinguished by its entire edges and paired air-vesicles. In scarcity of better fodder, oxen, sheep, and deer will cat it from the rocks, and in North Europeit is sometimes boiled for hogs with a little coarse flour. On account of the very large proportion of ash (up to 23 per cent. of the dry weight), it forms a valuable manure, and, although very imperfectly utilised in most places, is regularly harvested as 'varce' or 'vraic' by the farmers of the Channel Isles and their kinsmen of the adjacent mainland. The chemical composition also mado it the staple of the industry of kelpburning (see Kelp), once so important as a source of raw material to the soap-boiler and glass-maker. Even more esteemed for these purposes, although unfortunately abounding nearer low-water mark, was the kindred F. nodosus (Knobbed Wrack) with its solitary air-vesicles in the line of the absent midrib. F. serratus (Black Wrack), also very common and casily recognised by its serrated fronds without air-vesicles, was least valued. With these are gathered other less common species, as well as the Laminaria (see Tangle), exposed by the lowest tides. Besides manure, the only direct chemical utilisation of the Fnci is for the preparation of iodine; and the important proportion of iodine present justifies their ancient medicinal repute in the treatment of serofulous diseases, the

Quercus marina of ancient pharmacy being F. secretus, and the Æthiops veyetabilis the charred residue of this and its allies. An alcoholie extract is also frequently advertised for the treatment of

corpulence.
The genus Fuens and a few closely allied genera (e.g. Fucodium, Himanthalia, Cystoseira, genera (e.g. Fucodinin, Himanthana, Cystoseira, and notably Sargassum, specially described under Gulf-Weed), form the family Fucacee, which are the highest, and with the allied Laminariacee (see Tangle), also the most familiar representatives of the large alliance of brown seaweeds (see Seaweeds). The vegetative body representatives of the large affiliates of brown seaweeds (see Seaweeds). The vegetative body is usually a thallus, yet in Sargassum, &c., a distinction of this into stem and leaves is very complete. The branching of Fuens is dichotomous in one plane. Of the inner or medullary cells of the thallus, the outer wall becomes mucilaginous, while the less superficial of the rind cells develop filaments which grow inwards, so surrounding the inner cells within a network of filaments. The bladders are formed by the simple separation of portions of the tissue, the cavities becoming distended by air. A sexual multiplication may be said to be absent, but sexual reproduction is easily observed. A large area at the end of the frond becomes covered with small depressions, which are overgrown until they are spherical flasks with only a minute opening on the surface. The cells lining this flask or conceptacte proceed to divide, and many form barren cellular flaments which, however, instead of turning inwaids, as in vegetative growth, grow into the cavity of the llask or even project beyond it as a tuft of hairs. But many are arrested in division while still only two-celled, and the upper of these cells enlarges greatly. In some forms (Cystoseira, Himanthalia) this becomes the ovum, but in others its contents divide into two, four, or in Fucus eight ova; hence it is termed the eogonium. Other filaments again not only lengthen, but branch freely. Their terminal cells become antheridia—i.e. their protoplasm divides into a multitude of spermutavoids. Ferdivides into a multitude of spermatozoids. tilisation takes place when the ripe fertile fronds are left bare by the tide, the change of specific gravity through evaporation doubtless being of importance in aiding the escape of the sexual products. The euter membrane of the aggonium, like that of a medullary cell, becomes mucilaginous and gives way, and the groups of cight ova, still, however, enclosed within the inner wall, escape from the conceptacle; the authoridia, too, break off and escape to the opening of the conceptacle (per-haps helped by the slight contraction of the volume of this which evaporation must tend to produce). When the tide returns, both ova and spermatozoids break completely free and fertilisation takes place. Cross fertilisation, always possible even where, as in F. platyearpus, the same conceptacle develops ova and spermatozoa, becomes perfect in the more familiar species, of which the greater prevalence thus becomes more intelligible. The fertilised ownm soon develops a wall, becomes attached, and proeeeds to divide and lengthen, soon forming a root. like attachment at one end, a growing point at the other. See SEAWEEDS; also special articles above

Fuego, Tierra del. Sce Tierra Del FUEGO.

The chief mode of artificially producing that condition of matter which is called heat is by burning certain substances in air. These substances contain carbon and hydrogen, which during the chemical change implied by burning unite with the atmospheric oxygen, and as the temperature rises emit light as well as heat. Since these two elements are very widely distributed in nature, the

elassification of all the compounds which may be termed facts is somewhat difficult. After using wood for long ages men at last laid the mineral kingdom under requisition, but the fuels thence derived were soon recognised to be undoubtedly of vegetable origin. Some writers include all these under the term natural, and distinguish such derivatives as coke, charcoal, and combustible gases as artificial. Popularly, fuels are a large class of compounds, all of vegetable origin except the animal oils and fats, which produce heat and light when raised to 'kindling temperature.' Thus, besides coal and coke, wood and charcoal, and peat or turf, we must reckon tallow, wax, alcohol, coal and other gases, petroleum, creasote or 'dead-oil,' and others as facls. To be exhaustive, we should further refer to a sub-class called 'patent' faels,

The ordinary solid fuels fall under two heads: those containing water in a large proportion—e.g. wood, turf, and most coals—and therefore producing, when burned, hydrogen as well as carbon; and secondly, those which are purely carbonaceons—coke, charcoal, and anthracite. In recent times, since metallurgy has assumed such proportions in all countries, and especially since the application of all countries, and especially since the application of steam-power, the coking of coal has been more and more perfected, in order to concentrate the carbon and present a fuel capable of producing a ligher temperature. Wood as a fuel is either light and soft, as deal, or heavy and hard, as oak; but neither kind is now applied in metal-warking, unless in the concentrated form of charcoal. Wood contains so large a proportion of water as to reduce its heat-giving quality both in quantity and intensity, and contains less than half its weight of carbon (see table).

Charcoal is forned by condensing the carbon of wood and expelling the hydrogen and oxygen, just as coke is a concentration of coal by an analogous process. When the wood has been packed and so closed in as to prevent access of air, by raising the whole to a temperature of about 300°, the watery and gaseous particles are entirely expelled, and a mass of almost pure carbon remains. Similarly from coal we have coke, prepared by 'dry distillation' or imperfect combustion, so as to rotain the carbonaccous part in a concentrated state and set free the volatile ingredients and part of the sulphur. special property of coke for metallurgy, as compared with coal, is that, when exposed to high temperatures as in iron-blast furnaces, it does not become

pasty.

Turf er peat is an agglomeration of decayed vegetable matter, such as is frequently found on the sites of ancient forests. It is remarked that no instance of its formation occurs within the tropics; though Lycll describes the Great Dismal Swamp between Virginia and North Carolina to be a mass of black peat-like matter, 15 feet deep. Some peaty sediment has also been noted in a Cashmere lake. From holding so small a percentage of carbon, turf is of little use in the acta; but in Bavaria it has been utilised for locomotive engines after being compressed into bricks, and in some districts it has been converted into a species

Superior to the peat fuels, though still inferior in carbon to coal proper, are the lignites or brown coal, which occur in geological deposits of more recent formation than the true coal measures. The lignites contain a larger proportion of water than coals properly so termed; and are of so many varieties as gradually to pass into the bituminous class, which are known by their smoky flame and derive their name, not from any bitumen in their composition, but from the well-known tars which they produce. With the bituminous must be reckoned the 'coking coal' and the 'cannel (i.e.

The last-mentioned variety, morecandle) coal. over, includes the Edinburgh 'parot coal' (so named from its crackling) and the 'horn coal' of South Wales, which is characterised by a smell like that of burnt horn. At the head of this class of fuels is the anthracite coal, holding over 90 per cent. of carbon, and therefore of special value for some purposes in metallingy and otherwise. Anthracite is very compact, somewhat brittle, and does not stain the fingers like ordinary coal.

For comparing as fuels some leading types of coals the following table—which is an abstract from residual to the following table of the following table of

from various returns-will be of use, presenting the percentage of carbon, of hydrogen, and the ash left

after combustion:

Fuel.	Cubm.	Hydrogen,	Ash.
Welsh coal	91.3	33	1.6
Mayenne,	907	3.0	9
Pennsylvania	89.3	2.4	1.7
Newcastle	86.8	5-∷	1.4
Glasgow	83.0	3.3	0.1
Lancashire	836	5.7	28
Fifeshire	S1.3	3.8	4.5
Blanzy	75.4	5.3	2.3
Ayrshire	73.4	5-0	5.0
Lignites (E. France)	60 1	5.3	30
Asphaltun (Mexico)	78 I	9:3	28
Peats (France)	57.3	59	5.0
Wood (average)4	5-10:0	2.8	5.0

In primitive times the searcity of wood in some parts of Egypt and India suggested the use as fuel of sun-dried cakes of the dung of camels and oven.
A similar practice exists to day in the trackless steppes of Central Asia; and so, too, in various countries of Europe much refuse, especially of a vegetable nature, is utilised which in coal or wood producing districts is rejected as absolutely worthless. In eastern France, for example, and Germany all the spent bark from tanneries is formed into cakes for fuel, and estimated as worth about three-fourths the same weight of wood. Where eoal is not found or cannot profitably be conveyed, the preservation of forests is of manifest importance; and in certain parts of Europe, for example, trees are systematically planted in hedgerows and otherwise to provide fuel. For the same reason pollarding is resorted to, the branches being regularly cut, and the trunk left to grow fresh ruel. The scientific world, with as good a reason as the primitive races, have recently supply of vegetable and mineral fuels by fluid or gaseons substances. Thus, in smelting iron, for example, the earbonic oxide, which formerly was carried off in the smoke from the blast-formace, is now sometimes collected and conveyed in pipes to be utilised as fuel under steam boilers. Natural gas has also been used to good purpose, notably in Pennsylvania, United States, where in several instances it has been transferred for several miles for heating furnaces. In the same district petrolaum in a good partial ball and a several miles for heating furnaces. lenm is a recognised liquid fuel, as well as maphtha, its derivative. Another liquid fuel is creasote oil, derived from coal-tar, which is reported to possess, weight for weight, at least twice the power of coal for raising steam. The United States chemists and metallurgists are agreed that not only is a 'higher, steadier, and more even heat' produced by liquid fnel, but that, for heating iron more especially, a smaller quantity and shorter time suffice to obtain the same Baku petroleum is used as fuel for locomotives and steamers in South-east Russia. See Gas.

Under this head we subjoin some figures from a report of a Royal Commission drawn up in 1871 by Professor Rankine. The first column (A) shows the quantity of heat units generated by the fnel; the second (B) the pounds of water heated from 60° to 212°, and then, of course, converted into steam; and the third column (C) gives the comparative temperature of the fire or flame:

Fuel	A	B.	٤.
Petroleum	20,000	15	1646
Parathu-oil	20,000	15	4616
Oil from coal		15	4646
Cicasote		13	1495
Cont (from	n 13,890	8.95	2500
Coal firen	14,833	9.67	2500

The three points noted in testing a fuel chemieally are the intensity of the heat, the quantity of heat developed in combustion, and the luminosity. The last of these, however, affords but an imperfect measure of the temperature, because it is mainly due to the presence of solid particles. Instead of the second some writers use the term 'calorific power.' In ordinary coal combustion there are two power. steps of the process: (1) the carbon is separated from the hydrogen in light particles, which, unless hurned, appear as soot or smoke; (2) the hydrogen becoming ignited heats up the carbon particles, which therefore appear as flame. For the complete combustion, therefore, of a typical hydrocarbon we require not only air in sufficient quantity, but also intensity of heat above the fuel. In a good furnace the supply of coal should by mechanical contrivance be rendered as regular and uniform as that of air; and the body of the furnace should be so protected from the boiler surface and other cooling agents as to steadily maintain a temperature sufficient for thorough ignition of the flame.

What are called 'patent fuels' arise mainly from the desire to utilise the refuse arising from the production or wasteful use of coal. Such artificial fuel, however, is by no means an entirely modern device, since the Chinese have for ages been accustomed to mix coal-dust with clay and bitumen, so much so as to constitute a large branch of industry. The most common form of 'patent fuel' is a mixture of the small coal which accumulates at the pit mouths with sand, marl, or clay, or of some bitunious or resinons substance with sawdust. A second kind has dried and compressed peat as its basis, and is sold in the form of a dense brown solid. Another is an attempt to utilise small coke and the refuse 'breeze,' which is well known in charcoal burning. The 'charbon de Paris' is a combination of the dust of anthracite charcoal and similar refuse with coaltar, so as to form a paste and be moulded into small cylinders of about 4 inches in length. Briquettes (q.v.) are compounds of waste coal dust and piteh.

See Report of Royal Commission on the Coal of the United Kingdom (1871); Report on the Coals suited to the Steam Navy (1848); Rumford's Works, vols. ii., iii.; and Williams, Freel: its Combustion and Economy (3d cd. 1886).

Fuente Alamo, a town of Spain, 20 miles S. of Murcia. Pop. 7900.

Fuente Ovejuna, 'a small walled town of Spain, 45 miles NW. of Cordova. Pop. 7037.

Fuenterrabia. See Fontarabia.

Fuentes de Oñoro, a small village of Salawanta, Spain, on the Portuguese frontier, 15 miles WSW. of Ciudad Rodrigo, was the scene of an important battle of the Peninsular war on the 5th May 1811, when Wellington defeated Massena. The English lost 2000, the French 5000.

Fuero (Span.; Portuguese, forul, forues; Galician, foro: Gascoun, fors; Lat. forum), a term used in different senses. (1) The title of a law code, Fuero Juzzo, the so-called legislation of the Gothic kings of Spain; Fuero Real, &c. (2) The municipal charters of privileges granted by kings, lords, and monastic bodies to inhabitants of towns—Leon (1020), Najera (1035), Sahagun (1085), &c., especially to towns deserted or recaptured from the Moors or those used for frontier defence—e. Moors, or those used for frontier defence—e.g. Oloron, in Béarn (1080). Sometimes these charters were offered especially to foreigners, Fueros Francos.

Charters granted to attract settlers and those given by the royal power must he distinguished from others; fueros lased on legislation long antecedent and flourishing, e.g. those of Lerida (1228), were compiled 'de statutis scriptis et non scriptis, et moribus et usaticis, etiam legibus Goticis et Romanis.' The term is also applied to the capitulations granted to Moors and Jews, the oldest of which is that of Huesca (1089). (3) Modes and tenures of property, succession, &c., nearly equivalent to the French contumes, usages, or enstomary law—e.g. El Foro de Galicia, Los Fors et Costumus de Bèarn, &c. The date of the writing down of this class of fueros is no measure at all of their real antiquity. (4) The whole body of legislation and the constitution of certain practically autonomous states and communities in northern Spain and south-western France—e.g. the fueros of the provincias Vascongadas, Biscay, Alava, and Gnipuzcoa; in a slightly less degree of autonomy, the fueros of Navarre; and of a still less, those of Aragon, of Béarn, &c.

Groups 1 and 2 we may pass over to be studied in the documents special to each case. Group 3 is of far greater importance. In it we find traces of customs and tenures which have long disappeared from other codes, and the origin of which belongs to the tribal or pastoral condition of society. There are also anomalies not to be fully explained by our present knowledge, as the derecho consuctudinario of Upper Aragon, identical with the house community of the southern Slavs, though there is no apparent racial or other connection will the Slavs. In the chief region of these fueros, from the borders of Catalonia to Santander, there is no trace in the foral legislation of Gothic or Teutonic infinence. Within the states of class 4, and outside them in the same region, were various kinds of autonomies, or local self-governments, ununicipalities, federations of towns, valleys, districts, communes, each with its own special fuero. The term republicaes, republiques was often applied to those communities in transactions between themselves, as also by the kings of Spain in the Cortos of Navarre, to the Basque provinces, and to the Revolution.

The chief provision of the fueros, whereby these communities preserved their autonomy, was a freely elected legislative body, chosen according to the methods enstomary in cach district, meeting at a given place at given times. This assembly was called the junta in the separate Basque provinces, with the Junta General meeting at the oak of Guernica in Biscay, Cortes in Navarre, Etats in Béarn, Bilzaar in the Labourd, Cort, Tilhabet, &c., in the lesser communities. In these assemblies the right of taxation was jealously guarded. The contribution to the king was the last vote taken, after all grievances had been redressed and petitions heard, and then only as a voluntary gift. The repartition of taxes to individuals was in the hands of each separate community. Freedom of commerce existed, with few or no customs duties. The levy and command of the military forces of the states remained in their own power; the number of soltiers was fixed, with no compulsion to serve beyond the confines of the province, unless with consent of the juntas, &c., and for payment guaranteed. This did not prevent voluntary service of individuals. Jurisdiction of all kinds was in their own power. In all matters relating to properly, land-tenure, inheritance, &c., even in particular families, the local customs or fueros overrode both the general fueros and the general laws either of Spain or of France; only the nobles or Infanzones were subject to these. Under this constitution the Basque provinces flourished, and supported the

largest population per square mile in Spain, with the exception of Calicia, until the middle of the present century. On the death of Ferdinand VII. (1833), the liberal regency hesitated to confirm the fueros. Don Carlos, the late king's brother, raised the standard of revolt. The seven years' war was ended by the Convention of Vergara, 30th Angast 1839, and Isabella confirmed the fueros. Don Carlos, grandson of the first, headed the second Carlost war (1872-76). It resulted in the loss of the fueros of the provinces, which will gradually become assimilated to the rest of Spain. In France, save for the management of the communal property in some parishes, the fory were swept away by the Revolution and the Code Napoleon, though some traces still remain in the habits and customs of the people.

See the article Basques, and the following special books: Marichalar y Manrique, Historia de la Legislacion Civil en España (vol. ii. 2d ed. Madrid, 1868); Muñezy Rivere, Coleccion de Fueres Municipades (Madrid, 1847); Catalogo de Fueres y Cartas-Pueblas de España (R. Academia de Historia, Madrid, 1852); Mazure et Hatoulet, Fors de Béarn (Pan, 1842); C. B. de Lagrèze, La Navarre Françaiss (Paris, 1881); the last editions of the separate Fueres published in each province at Zaragoza, Pamplona, Tolosa, Bilbao.

Fugger, a remarkable Swahian family, which rising by industry and commerce founded lines of counts and even princes. The ancestor of the family was John Fugger, master-weaver, horn in 1368 at Grahen, near Angshurg. His eldest son, John Fugger, acquired by marriago, in 1370, the freedom of Angshurg; he died in 1469. But the real founder of the house was John's second son, Jacob Fugger, who died in 1469, and was the first of the Fuggers that had a house in Augsburg, and carried on an already extensive commerce. Of his seven sons, three, Ulrich, George, and Jacob II., by means of industry, ability, and integrity, extended their business to an extraordinary degree, and laid the foundation for the palmy days of the family. They married into the neblest houses, and were raised by the Emperor Maximilian to the rank of nobles. The emperor mortgaged to then, for 10,000 gold guldens, the county of Kineherg and the lordship of Weissenborn. Ulrich Fugger (1441–1510) devoted himself specially to commerce with Austria. Jacob Fugger (1459–1525) farmed the mines in Tyrol, accumulating immense wealth; he lent onormous sums to various potentates, and built the magnificent eastle of Fuggerau, in Tyrol.

But it was under Charles V. that the house attained its greatest splendom. Jacob having died childless, and the family of Ulrich being also extinct, the fortunes and splendom of the house rested on the sons of George Fugger, who died in 1506. His two younger sons, Raimund and Antony, earried on the business, and bocame the founders of the two chief and still flourishing lines of the house of Fugger. The two brothers were zealous Catholics, and with their wealth supported Eck in his opposition to Luther. During the died held by Charles V. at Augsburg in 1530 the emperor lived in Antony Fugger's splendid house in the Wine Market. On this occasion he raised both brothers to the rank of counts, and invested them with the still mortgaged properties of Kirchberg and Weissenhorn; and a letter under the imperial seal conferred on them the rights of princes. The Emperor Fordmand II. raised the splendom of the house of Fugger still higher by conferring great additional privileges on the two oldest of the family, Counts John and Jerome. The Fuggers continued still as nobles to carry on their commerce, and further increased their immense wealth. They attained the highest posts in the empire, and several princely houses prided

themselves on their alliance with the house of Fugger. They possessed the most extensive libraries and art collections, maintained painters and musicians, and liberally encouraged art and science. Their houses and gardens were masterpieces of the architecture and taste of the times. While thus indulging in splendour, they were not less bent on doing good. Jacob (the second of the name) bought houses in one of the suburbs of Augsburg, pulled them down, and built 108 smaller houses (called the 'Fuggerei'), which he let to poor citizens at a low rent. The race is still continued in the two principal lines of Raimund and Antony, besides collateral branches. The domains are chiefly in Bavaria. See Kleinschmidt, Angsburg, Nurnberg, und thre Handelsfürsten (1881).

Fugitation, the Scottish equivalent of Ontlawry (q.v.) in England.

Fugitive Slave Law. The constitution of the United States of America having recognised slavery, or 'service,' as it was termed, provided that persons held to service or labour in one state, under the laws thereof, and escaping into another, should be delivered up, on claim of the party to whom such service or labour might be due. An act passed by congress in 1793, providing for the reclamation of fugitives, was superseded by a more stringent act in 1850, containing many obnoxious provisions; a larger fee, for instance, was paid to the indicial officer when the person arrested was adjudged to be a slave than when he was declared upon, to render the officers personal assistance in the performance of their duties. Any assistance rendered to a fugitive, or obstruction offered to his arrest, was penal, and many persons were remanded under the act; but the increased hostility to slavery which it engendered actually led to

assistance being given in a larger number of escapes than ever before, mainly through the organisation known as the 'underground railroad.' The act was repealed after the outbreak of the eivil war; and, since slavery has been abolished, the constitutional provision has lost all importance.

Fugleman (Gor. flugelmann, 'a man placed at the end of a file;' from flugel, 'a wing'), an intelligent soldier posted in front of a line of men at drill, to give the time and an example of the motions in the manual exercises.

Figure is the form of musical composition in which all devices of counterpoint, or the art of combining independent ideas in music, find their most fitting use. The laws which govern it are as strict as munerons, and can only be very generally summarised. The 'subject' chosen as the basis of the composition should present a complete and distinct individuality, which to be readily recognised in its permutations should be well marked. It is given out by any one part, and immediately taken up by a second—its follower or pursuer (fuga, 'a flight'). This 'auswer,' as it is called, is identical in form with the subject, or slightly modified in accordance with a rule which requires the upper division of the octave (G to C in the scale of C) to correspond to and 'answer' the lower (C to G). During the



'answer' the first part supplies an accompaniment or 'counter-subject,' which should be a figure of contrasted character, and interesting enough to enable



it to play its important part in the subsequent development. A third part joins by enouncing the subject, while a fourth, fifth, even a sixth part may be added, entering alternately with the answer, subject, and answer. The introduction of all the parts constitutes the first section, and is called the 'exposition.' During the development, which finds its place in the second section, the composer should show his skill in the use of imitation, canon, &c., and so arrange his material that the intricacy and interest gradually increase. Before the conclusion of the fugue he should present a strette, in which the parts press on and overlap each other in their enunciations of the subject.



A 'pedal point'-a bass note held while the upper parts move in as skilful a complication as the composer can devise—usually precedes the inal cadence. 'Episodes,' or matter connected or in character with the subject, may be introduced throughout the development to afford variety, but these must be short, and must not be allowed to distract the attention. When two or three sub-jects are treated simultaneously the fugue is called

double or triple.

Formulated early in the history of modern music, the vocal fugue was elaborated during the 'golden age of counterpoint' in the end of the 16th century. A new world was opened to it by Frescobaldi, who freed it from the limitations of the human voice, and first wrote instrumental fugues. Sebastian Bach, in his vocal and instrumental fugues,

ments are to be found in his oratorios.

Although fugues in composition and performance Although fugues in composition and performance have always been more or less 'caviare to the general,' the opinion of sound musicians in the present as well as the past is unanimous as to their value, interest, and the beauty of those by the standard writers. Details in construction have continually changed and developed during the three centuries of the evistence of fugues, and textbooks are as numerous as teachers. Those by Sir F. (fore Ouseley (prescribed at Oxford University); Japlassolin and his predecessor, Richter, of Leinzig dada-solin and his predecessor, Richter, of Leipzig Conservatorium; and Dr Higgs' Primer are probably of more use to-day than the famous works of Albrechtsberger, Reicha, &c. Bach's Art of Fugue is a collection of fifteen fugues, four canons, &c. on one subject—a practical and invaluable illustration from the hand of the greatest haa-ter of counterpoint. See article 'Figue' in Ina-ter of counterpoint. See article 'Fngue' in Stainer and Barrett's Dictionary of Musical Terms.

Führen. See Fünen.

Fuii-san. See Fusiyama.

Fu-kian. or FC-CHIEN, an eastern maritime province of China (q.v.).

Fulahs, also Fulbe, Fellani, Fellata, and Peulhs, a people of the Soudan, extending from Senegal in the west to Darfur in the east, and from Timbuktu and Haussa in the north to Joruba and Adamawa in the south. Their ethnographic relations are not yet definitively settled, some allying them with the Soudan negroes, some with the Nuba of the Nile region, others regarding them as an isolated race. first read of them about the beginning of the 14th century in Ahmed Bábá's History of Soudan. After that century large bands of them left their home on the confines of Senegambia—i.e. Futa-Julion—and, proceeding eastwards, spread themselves over the greater portion of the Soudan. There appear to be two distinct branches, a dark-skinned division, having its centre in Bornu and Adamawa, and an olive kinned division, occurring chiefly in Sakoto. All are strong and well-built, with long hair and regular Caucasian features. They are very intelligent, have a frank, free bearing, are trustworthy, posses considerable self-respect and decision of character, and are devoutly religious. They probably number 7 to 8 millions altogether. The Fulahs are a conquering race, not a homogeneous nation; and have founded several kingdoms throughout central and southern Soudan, at these of Educate Country and Marine and Adams. as those of Sókoto, Gando, Massina, and Adamawa. The numerous tribes belonging to their stock are generally divided into four groups or families—the Jel, the Baá, the Só, and the Beri.

Most of them became converted to Mohammedan-

ism about the middle of the 18th century; in 1802, under the Imam Othman, they commenced a religious war on the surrounding pagans, which terminated in the establishment of the great Fulah empire of Sokoto. The Fulahs are an industrious people: they practise agriculture, rear eattle, and carry on trade; they also work iron and silver, manufacture with great neatness articles in wood and leather, and weave various durable fabrics. They have mosques and schools in almost all their towns. See Crozals, Les Peulles (Paris, 1883).

Fulcrum, in Mechanics, is the prop or fixed point on which a lever moves. See Lever.

Fulda, a town of the Prussian province of Fulda, a town of the Prussian province of Hesse-Nassan, 67 miles NE. of Frankfort-on-the-Main by rail, and on the river Fulda, is an irregularly built old town, still partially surrounded by its ancient walls. It is principally celebrated for its Benedictine abliey, founded by St Boniface (q.v.), the 'Apostle of Germany,' in the Sth century, which subsequently became a great centre of missionary enterprise as well as a notable centre of missionary enterprise as well as a notable seat of theological learning. Towards the end of the 10th century its abbot was made primate of all the 10th century its abbot was made primate of all the abbeys of Germany. Having become corrupted and subject to many abuses, the monastery was thoroughly reformed in the early part of the 11th century by the introduction of fresh monks from Scotland. The cathedral, six times destroyed by fire, was rebuilt in 1704–12 on the plan of St Peter's at Rome. It is 324 feet long, and covers the crypt of St Boniface. The Romanesque church of St Michael (822) was restored in 1854. In the library are MSS, of Boniface's Gospels, besides other valuable MSS, and early printed books. The town has manufactures of various textiles, with dyeing, tanning, and the making of wax candles. Pop. (1875) 10,799; (1885) 12,226. Fulda, which owed its existence to the abboy, was created a town in 1208, and from the 16th century onwards had a very eventful history, being century onwards had a very eventful history, heing taken in the Peasants' War, the Thirty Years' War, and the Seven Years' War. From 1734 to 1804 it possessed a university. During the Kulturkampf it was one of the strongholds of the German Ultramontane party. See works by Gegenbaur (1874) and Schneider (1881).

Fulgarites (Lat. fulgur, 'lightning'), tubes due to the action of lightning. They have been most frequently observed in loose sandhills, but have often been detected also in more compact rock. They are formed by the actual fusion of rock. They are formed by the actual fusion of the materials through which the lightning passes. The internal surface of the tubes met with in sandhills is completely vitrified, glossy, and smooththe thickness of the wall varying from atth to to the of an inch, while the diameter of the tubes ranges up to 2½ inches. They usually, but not always, deseend vertically from the surface, sometimes dividing and subdividing, and rapidly narrowing dividing and subdividing, and rapidly narrowing downwards till they disappear. Fulgarites have often been detected on mountain-tops. In some eases the rocks attacked by lightning have the appearance of being covered with a black scoriaceous plaster, which looks as if it had 'nun' or dripped. In other cases the rocks are described as being drilled—the holes produced by the lightning being lined internally with dark classy subas being drilled—the holes produced by the ngin-ning being lined internally with dark glassy sub-stance. Fulgurites were first observed in 1711 by the pastor Herman, at Massel, in Silesia, and have since been found in many places; but their origin was first pointed out by Dr Hentzen in 1805.

Fulham, formerly a village, but now a suburb of London, in the south of Middlesex, on the left bank of the Thames, 4½ miles SW. of Charing Cross. Here since 1141 has been the palace of the bishops of London, but the present building is mostly not more than a century old. The church is ancient, and contains the touths of many of the bishops. Fulham also has memories of Bodley, Florio, Richardson, Hallam, Crotch, and Albert Smith.

Fulica. Sec Coor.

Fuligula. See Pochard.

Fuller, Andrew, an eminent Baptist theologian and controversialist, was born, the son of a small farmer, at Wicken, Cambridgeshire, February 6, 1754. He had his education at Soham free school, but at an early age had to turn to farmwork. In his seventeenth year he became a member of a Baptist church at Soham, and soon began to speak with such acceptance that in 1775 he was chosen pastor of a congregation there. His small stipend of £21 per annum he endeavoured to increase by keeping, first a small shop, and then a school. In 1782 he removed to a pastonate at Kettering, in Northamptonshire. His treatise, The Gospel worthy of all Acceptation (1784), involved him in a warm controversy with the ultra-Calvinists, but showed him already a theologian of rare sagacity and insight, and still rarer fearlessness and sincerity. On the formation in 1792 of the Baptist Missionary Society by Dr Carey and others, he was appointed its secretary, and he devoted heneeforward the whole energies of his life to its affairs. His controversial treatise, The Calvinistic and Sociation Systems examined and compared as to their Moral Tendency (1793), was attacked by Dr Tonlmin and Mr Kentish; but Fuller replied vigorously in his Sociationism Indefensible (1797), an on-slaught on Deism, and Expository Discourse on the Book of Genesis (1806), besides a multitude of single sermons and panulitets. He died May 7, 1815. His complete works were collected in 1831, and re-issued in 1845 with a memoir by his son.

Fuller, George, an American artist, was born in Deerfield, Massachusetts, in 1822. As early as 1857 his work attracted attention, and during the last years of his life his pictures were warmly admired by many for their richness of tone and peculiar handling, though they never appealed to the popular taste. He died 21st March 1884. An exhibition of his paintings was held in Boston in that year, and a costly memorial work on his life and genius was published there in 1887.

Fuller, Sarah Margarer, Marchioness Ossoli, anthor, was born at Cambridgeport, Massachnsetts, May 23, 1810. She received much of her early education from her father, Timothy Fuller, a hard-working lawyer and congressman, after whose death (1835), intestate and insolvent, she assisted her family by school and private teaching. In Boston the leaders of the transcendental movement were her intimate friends; here she edited The Dial, translated from the German, and wrote Summer on the Lakes (1843). In 1844 she published Woman in the Nineteenth Century, and in the same year she proceeded to New York, on the invitation of Horace Greeley, then editor of the Tribune, and contributed to that journal a series of miscellaneous articles, which afterwards appeared in a collected form as Papers on Literature and Art (1846). In 1846 she went to Europe, where she made the acquaintance of many eminent people; and in 1847, at Rome, she met the Marquis Ossoli, to whom she was married in December of that year. She entered with enthusiasm into the struggle for Italian independence. In 1849, during the siege of Rome, she took the charge of a hospital; and on the capture of the city by the French she and her husband, after a period of hiding in the Abruzzi, and a few mouths at Florence, sailed with their infant from Leghorn

for America, May 17, 1850. The vessel was driven on the shore of Fire Island, near New York, by a violent gale in the early morning of July 16; the child's body was found on the beach, but nothing was ever seen afterwards of Margaret Fuller or her lusband. Her Autobiography, with memoirs by Emerson, Charke, and Channing, appeared in 1852 (new ed. 1884); there are also lives by Julia Ward Howe (1883) and T. W. Higginson (Boston, 1884, 'American Men of Letters' series).

Fuller, Thomas, divine, historian, and wit, was hom in 1608 at Aldwinele St Peter's, Northamptonshire, elder son of the painful peacher, its rector and prebendary of Sarum, and of his wife, Judith Davenant. At his baptism (June 19) his godfathers were his two uncless, Dr Davenant, president of Queens' College, Cambridge, and Dr Townson, both of whom heavier in spaces ion his bapts of Salishum. of whom became in succession hishops of Salisbury. The hoy early showed striking promise, and was in 1621 entered at Queens' College, Cambridge, where he graduated B.A. in 1625, and M.A. in due course three years later. Being unaccountably passed over in an election of follows of his college, he was transferred in 1628 to Sidney Sussex College, and in 1630 received from Corpus Christi College the curacy of received from Corpus Christi College the chiacy of St Benet's, where he preached those Lectures on the Book of Job which he published in 1654. Next year his uncle gave him a probend in Salisbury, in 1634 he was appointed to the rectory of Broadwinsor in Dorsetshire, and in 1635 he proceeded B.D. Already in 1631 he had published his first work an incentious but indifferent norm of 124. work, an ingenious but indifferent poem of 124 seven-lined stanzas, in three parts, entitled David's Heinous Sin, Hearty Repentance, and Heavy Punishment; and here he fulfilled faithfully the duties of ment; and here he fulfilled faithfully the duties of a parish priest, married happily, and compiled his first ambitions work, the characteristically bright, vigorous, and quaint History of the Holy War (1639), embracing the story of the Crusades, as well as The Holy and Prophane States (1642), a unique collection of essays and characters, full of shrewdness, wisdom, and kindliness, lightened up on every page by the most unexpected humour, and by marvellous felicity of illustration. In 1640 Fuller sat as proctor for Bristol in the Convocation of Canterlury, and was one of the select committee appointed to draw up canons for the better governappointed to draw up canons for the better government of the church. In the same year he published his Joseph's parti-coloured Coat, a comment on 1 Cor. xi. 18-30, with eight sermons full of the true Fuller flavour. Soon after he removed to London to become an exceedingly popular lecturer at the chapel of St Mary Savoy. In the exercise of his function he Mary Savoy. In the exercise of his function he strove to allay the bitterness of party-feeling, but when the inevitable war broke out he adhered with fearless firmness to the royal cause, and shared in Yet his characteristic moderation of its reverses. tone offended the more hot headed among the royalists, who misread his temperance into lukewarnmess. He saw active service as chaplain to Hopton's men, and printed at Exeter in 1645 for their encouragement his Good Thoughts in Bad Times, a manual of fervid and devout short prayers and meditations, which was followed in 1647 by a second, Better Thoughts in Worse Times, and by his twenty-one Short dialogues, The Cause and Cure of a Wounded Conscience. In the same year he began again to preach, at St Clement's, Eastcheap, but was soon suspended. His enforced leisure he gave with insuspended. His enforced lessure he gave with indomitable indu-try to study and compilation, being helped the while by patrons who knew his merit. One of the kindest of these was the Earl of Carlisle, who made him his chaplain, and presented him to the curacy of Waltham Abbey, which Fuller managed to keep throughout the troubles by passing the ordeal of Cromwell's Tryers. In 1650 he published his great survey of the Holy Land, full of maps and engravings, A Pisgah-sight of Palestine,

where for once geography became a peg whereon to hang alternate wit, wisdom, and edification. The very rocks and deserts are fertilised by his fancy, and not one of his 800 pages is dry or tedious. In 1651 appeared Abel Redivious, a collection of religious hieraphies, of which Fuller himself wrote seven. His first wife had been already dead ten years when in 1651 he married a sister of Roper, Vi-count Baltinglass. In 1655 he published in a folio volume battengase. In 1935 he paintened if a market bits long-projected Church History of Britain, from the birth of Christ till the year 1648, divided into eleven books—a twelfth being a History of the University of Cambridge. The early books of the University of Cambridge. The early books are divided into centuries, the later into sections, and in both the paragraphs are duly labelled and numbered with much ostentation of method, de-pite the perpetual digressions into heraldry and the like 'for variety and diversion. . . to divert the wearied reader.' Each book is dedicated to -ome noble patron, and a dedication is prefixed to some none patron, and a dedication is prefixed to every century or section. Altogether there are no fewer than 75 dedicatory epistles, addressed to 85 patrons or patronesses, of whom many, he tells us, 'invited themselves on purpose to encourage my enleavours.' The work was bitterly assailed by Dr Peter Heylin with no less than 237 several 'Animadversions in his Examen Historicum (1659), and playedly vetter them a bittery full of Annual ersums in his Evanue Instorucian (1009), as a rhapsoily rather than a history, full of 'impertinencies' as well as errors, and still worse marred by partiality to Paritanism. Fuller at once replied in The Appeal of Injured Innocence, in which he gives his animal vertor's own words in their entirety followed by his own replies structure. Nowhere is his strong sense sharpened into bright and structure wit more consciences. scriutim. Nowhere is his strong sense sharpened into bright and stinging wit more conspicuous than here. Moreover, broad, open-uninded candour and large toleration to all honest opinion and fair argument, wedded to intense personal loyalty to his own church, are characteristic notes throughout, while it would be difficult to find a nohler example in our literature of magnaninous Christian charity tremulous with pathos than the concluding epistle to his antagonist. Bishop Nicolson, in The English Historical Library (2d ed. 1714), failing with one-eyed vision to see that he had before him an English classic, and one sut generis moreover, laments the lack of 'the gravity of an historian,' and the weakness for 'a pretty story' and for 'pun and quibble,' yet in his superior manner admits that, 'if it were possible to refine it well, the work would be of good his superior manner anners that, in it were pos-sible to refine it well, the work would be of good use, since there are in it some things of moment hardly to be had elsewhere, which may often illustrate dark passages in more serious writers.'

Fuller had been presented by Lord Berkeley in 1653 to the rectory of Cranford in Middlesex, and at the Restoration he was reinstated in his former preferments. In that year he published his Mixt Contemplations in Better Times, was admitted D.D. at Cambridge by royal mandate, and appointed chaplain-in-extraordinary to the king. Apparently also he would have been made a bishop had he lived. He died in London after a few days' illness of the 'new disease'—a kind of typhus fever, 16th August 1661, and was buried in the chancel of Cranford church. The Latin epitaph inscribed on a mural tablet there is not so brief as his own suggestion—'Here lies Fuller's earth,' but contains a conceit worthy of his own pen, how that while he was labouring to give others immortality he obtained it himself. His great work, The Worthies of England, left unfinished, was edited by the pious care of his son, and published in 1662. Fuller tells us elsewhere of his 'delight in writing of histories,' and we know that the preparation of his greatest work covered nearly twenty years of his troubled life. At the outset he sets forth his five ends in the book—each one sufficient in itself: 'to gain

some glory to God, to preserve the memories of the dead, to present examples to the living, to entertain the reader with delight, and to procure some honest profit to myself. The first four were most to Fuller, and all these he gained. The Worthies is a magnificent miscellamy of facts about the counties of England and their illustrious natives, lightened up by nurivalled originality, spontaneity, and felicity of illustration, and aglow with the pure fervour of patriotism—the very apotheosis of the gazetteer.

The earliest and anonymous biographer of Fuller tells us that his stature was somewhat tall, 'with a proportionable bigness to become it,' his countenance cheerful and ruddy, his hair light and curly, his carriage such as could have been called 'majestical' but for his complete lack of pride, his deportment 'much according to the old English guise.' Such also is the Berkeley portrait, reproduced in Bailey's Life. His genial disposition, the charm of his company, and his marvellous feats of memory are mentioned by Pepys and all who have since

written of him.

Of the judgments pa-sed upon his genius, best known and hardly exaggerated is that of Coloridge: 'Wit was the stuff and substance of Fuller's intellect. It was the element, the earthen base, the material which he worked in; and this very circumstance has defrauded him of his due praise for the practical wisdom of the thoughts, for the beauty and variety of the truths, into which he shaped the stuff. Fuller was incomparably the most sensible, the least prejudiced, great men.' His wit is fast wedded with wisdom and strong sense, and with all its freedom is never unkindly or irreverent—he 'never wit-wantoned it with the majesty of God.' He lays a spell of quite a peculiar kind upon his reader, who will either return to him often or neglect him altogether. His style shows admirable narrative faculty, with often a nervous brevity and point almost new to English, and a homely directness ever shrewd and never vulgar; while 'his wit,' says Charles Lamh, 'is not always a hanon sicrum, a dry faculty of surprising; on the contrary, his conceits are oftentimes deeply steeped in human feeling and passion.' The pen that described negroes as 'the images of God cut in clony' was that of a good man as well as a great writer.

See the fine 17th-century anonymens enlogy reprinted in vol. i. of J. S. Brewer's edition of the Church History (Clarendon Press, 6 vols. 1845); Rev. Arthur T. Russell's Mcmorials of Dr Fuller's Life and Works (1844); Henry Rogers' Selections and Essay (1855); J. E. Bailey's Life of Thomas Fuller (1874), also his article in vol. ix. (1879) of the Encyclopedia Britannica; and the Rev. Morris Fuller—a descendant's Life, Times, and Writings of Thomas Fuller (2d ed. 1886). Bailey's unique collection of books relating to Fuller was acquired by the Manchester Free Library in 1889.

Fuller's Earth, a mineral consisting chiefly of silica, alumina, and water, with a little magnesia, lime, and peroxide of iron. The silica is about 53, the alumina 10, and the water 24 per cent of the whole. It is regarded as essentially a hydrous bisilicate of alumina. It occurs in beds, associated with chalk, colite, &c.; is usually of a greenish-brown or a slate-blue colour, sometimes white; has an uneven earthy fracture and a dull appearance; its specific gravity is from 1.8 to 2.2; it is soft enough to yield readily to the nail; is very greasy to the touch; scarcely adheres to the tongue; falls to pieces in water with a hissing or puffing sound, but does not become plastic. It has a remarkable power of absorbing oil or grease; and was formerly very much used for fulling cloth (see WOOLLEN MANUFACTURE), for which purpose it was considered so valuable that the exportation

31

of it from England was prohibited under severe penalties; it is still used to a considerable extent. The annual consumption in England is said to have at one time exceeded 6000 tons. It is found have at one time exceeded 6000 tons. It is found at Nutfield, near Reigate, in Surrey, in cretaceous strata, where it forms a bed varying in thickness from less than 8 feet up to 12 feet or more. The lower part of this hed is blue, but, owing to the peroxidation of iron, the upper portion is buff-coloured—the change being brought about by the infiltration of water. It is also found in Bedfordshire, Nottinghamshire, Kent, Surrey, and elsewhere. There is a considerable deposit of it at Bath, where the group of associated lune and Where There is a considerable deposit of it at Bath, where the group of associated blue and yellow clays and marl has received the name of 'the Fuller's Earth Series,' belonging to the Jurassic system. It is also found at Maxton in Scotland, and at various places on the Continent, as in Saxony, Bohemia, and near Aix-la-Chapelle.

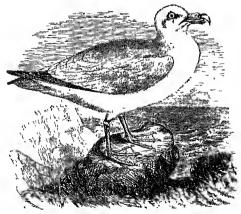
Fuller's Herb or Teasel. See TEASEL.

Fullerton, Lady Georgiana, writer of religious novels, daughter of the first Earl Granville, was born at Tixall Hall, Staffordshire, 23d September 1812, and in 1833 married Alexander Fullerton. Two years after publishing her first story, Ellen Middleton (1844) she became, under the influence of the Tractarian movement, a convert to Catholi-cism. The rest of her life was devoted to charitable cisin. The rest of her life was devoted to charitable works and the composition of religious stories: Grantley Manor (1847), Constance Sherwood (1864), A Stormy Life (1864), Mrs Gerald's Niece (1871), Gold-digger and other Verses (1872). She died at Bournemouth, 19th January 1885. See her Life by Father Coleridge, from the French of Mrs Craven

Fulmar, or Fulmar Petrel (Fulmarus), a genus of sea-birds, in the family Procellaridae, beside the albatross, the storm petrel, and the puffin, and near the gulls (Laridæ). The genus includes some forty species, which are widely distributed and strictly oceanic. The members agree in general features with the parties were a features with the parties were a features. in general features with the petrels proper (Procellaria), and all possess strong hooked bills. The general appearance is gull-like; the wings long and the flight powerful; the tail short; the hind-toe reduced to a sharp clawed wart. They are said to defend themselves from attack by disgorging an ill-

flavoured oily secretion from the alimentary canal.

The best-known species, the common Fulmar (F. glacialis), frequents the northern scas in numbers so immense that Darwin awards it the



Fulmar (Fulmarus glacialis).

somewhat unverifiable credit of being the most abundant of birds. It is a rarity on British or indeed

European coasts, but nests or at least used to nest in St Kilda, Skye, Barra, and Fonla, and is common farther north in the Faroes, Iceland, Spitzhergen, and similar localities. The bird is about the size of a duck, has the general colouring of the common gull (*Lucus canus*), and is well known as the Greedy Molly-mawk, which, with beautiful gliding get north of Shetland. It feeds on tishes, molluses, jelly-fish, on the offal of the Newfoundland cod-lisheries, on the debris thrown from the successful whalers, and is in fact an indiscriminately carnivorous bird, with a preference for blubber. On a dead whale they are said to glut themselves till they are unable to fly, and sallors not unfrequently catch them with lines and hooks baited with fat. From living whales they are said to pick the Cirripedes parasitically imbedded in the skin. They breed on rocky shores, but there is no nest worth mentioning. Although the individuals are so numerous, there is only a single egg, which has a white colour.

The greedy fulmar is of no little use to the natives of the regions where it abounds. Both eggs and young are collected and eaten, and the birds are also valued for their down and oil. In St Kilda the quest for fulmars used to be an important and extremely perilous means of liveli-hood, while it is said that in a single little island, Westmanayjar, south of Iceland, over 20,000 of Westmaneyjar, south of Iceland, over 20,000 of the strong-smelling, uninviting, young fulmars are salted every summer for winter fare. The oil, which is obtained from the flesh and stomach, is amber-coloured, and has a peculiar, persistent, and unpleasant smell. From the Pacific, F. pacificus is usually distinguished; and the large F. giganteus from southern regions is also worthy of note. See

PETREL.

Fulminates. This term is applied to a class of salts having the same percentage composition as the cyanates (see CYANGEN), but, unlike them, exploding violently when heated or struck. Like Gun-cotton (q.v.) and Dynamite (q.v.) these salts contain the group of atoms represented by the formula NO₂, and which seems to confer explosive properties in so many cases. There are many fulminates corresponding to the different metals, but it will suffice if attention is drawn to fulminating mercury and silver. Fulminating mercury is prepared by heating mercury with alcohol and nttric acid, and after purification it is obtained in white silky crystals, which have a sweetish taste and are soluble in water. When moist these crystals may be handled without risk of explosion, but when dry they detonate violently on being struck or when a spark falls on them. This salt is largely used in the manufacture of percussion caps, for which purpose it is mixed with nitre, sulphur, &c. Fulminating silver is prepared by heating a solution of nitrate of silver with nitric acid and alcohol. It forms small white needles having a bitter taste and poisonous properties. It explodes more readily than the mercury salt, and the greatest care is requisite in its manufacture. It is used in making crackers and other detonating toys.

The folminates should never be prepared by amateurs, as accidents very readily occur.

Fulnek, a town of Moravia, 10 miles NNW. of Neutitschein, with a Capuchin convent, and manufactures of silk, cloth, and fezes. Pop. 3692. Fulnek was formerly a principal seat of the Moravian Brethren, and gave its name to Fulneck in Yorkshire, 51 miles E. of Bradford, where a Moravian settlement was established in 1748.

Fulton, ROBERT, a celebrated American engineer, was born of Irish parents in 1765 in what is now Fulton township, Pennsylvania. The years

1782-85 were spent in Philadelphia, where he devoted himself to the painting of miniature por-traits and land-capes. In 1786 he proceeded to London, where for several years he studied under West; but some paintings which he produced in Devon-hire having gained him the patronage of the Dake of Bridgewater and Earl Stanhope, he abandoned art and applied his energies wholly to nechanics, for which he had early shown a strong bent. In 1794 he obtained from the British government a patent for a double-inclined plane, the object of which was to set aside the use of locks; and in the same year he invented a mill for sawing and polishing marble. He afterwards prepared plans for the construction of cast-iron aqueducts and bridges, and patented in England a machine for spinning flax, a dredging-machine, and several boats. He was received as a civilengineer in 1795, and published a treatise advocating small canals. In 1797 he proceeded to Paris, where he remained for several years, devoting himself to new projects and inventions, amongst which was a submarine best, intended to be used in torpede warfare, but neither the French nor the British government, which he next tried, could be induced to take his invention up, although commissions were appointed in both cases to test it value. Having failed in this matter, he next turned his attention to a subject that had occupied his mind as early as 1793—the application of steam to navigation. In 1863 he launched on the Seine a small steamboat, which immediately sauk; but a trial-trip was made by a second boat soon after, though without attaining any great speed. In 1806 he returned to New York and pursued his experiments there. He New York and pursued his experiments there. He perfected his Torpedo (q.v.) system, though it was never actually adopted; and in 1807 he launched a steam-vessel upon the Hudson, which made a successful start on the 11th August, and accomplished the voyage up the river (of nearly 150 miles) to Albany in thirty-two hours. From this period steamers (for the construction of which Fulton received a patent from the legislature) came into pretty general use upon the rivers of came into pretty general use upon the rivers of the United States. Although Fulton was by no means the first to apply steam to navigation, yet he was the first to apply it with any degree of practical success (see STEAM-NAYIGATION). His reputation was now firmly established, and he was employed by the United States government in the employed by the United States government in the execution of various projects with reference to canals and other works. In 1814 he obtained the assent of the legislature to construct a steam warship, which was launched in the following year, but never tested in warfare. Though the labours of Fulton were attended with such great success, various lawsuits in which he was engaged in refervarious lawsints in which he was engaged in reference to the use of some of his patents kept him in constant auxiety and tended to shorten his days. He died at New York, 24th February 1815. See his Life by Colden (New York, 1817); Robert Fulton and Steam Navigution, by Thos. W. Knox (1831) (1886).

Fum, or, more properly, Fung, the Chinese Phomix, one of the four symbolical animals supposed to preside over the destinies of the Chinese empire. Its appearance indicates an age of universal virtue, the influence of which has extended throughout creation. It is supposed to have the forepart of a goose, hind-quarters of a stag, neek of a snake, tisk's tail, fowl's forehead, down of a duck, dragon's marks, the back of a tortoise, face of a swallow, and beak of a cock, with claws and feathers of various colours, red crest, and golden beak. It is about six cubits high, and comes from the East.

Fumage. See HEARTH-MONEY.

Fumariaceae, an order of dieotyledonom herbs, allied to Papaveraceae, of which they may

be regarded as specialised forms. There alised forms. are about a hundred species, mostly palmarctie, and mostly wedls, but some of great heauty (see DICENTRA). Several species of Finnaria and Corydalis are natives of Britain. The Common Fumitory (Fumaria officinalis) is a very common annual weed in gaidens and cornfields, rank, yet of rather delicate and beautiful appearance, and easily extinpated. It was formerly much employed in medicine, as also in dye-ing, and as a source of potash.



Common Fumitory (Fumaria officinalis).

Funaric Acid, H₂C₄H₂C₄, occurs in many plants, especially in Corydalis and Funnitory. It is of interest from a chemical point of view as being isomeric with malle acid.

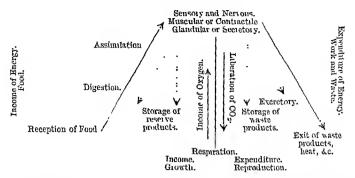
Funigation (Lat. fumigatio, from fumus, 'smoke'), the cleanising or medicating of the air of an apartment by means of vapours, omployed chiefly for the purpose of detaching infectious poisons from elothing, furniture, &c. Most of the methods of fumigation formerly employed have little real value, and are to be looked on chiefly as gratoful to the senses, as, for instance, the burning of frankingense, camphor, &c. The really active processes are noticed under the article DISINFECTANTS. See also DEODORISERS, CONTAGION, INFECTION, GERM THEORY, PASTILLES.

Funaria, a genus of Mosses, of which one species common on old walls and dry barren soils, F. hygrometrica, is of particular interest on account of the hygrometric twisting of its fruit-stalk.

Funchal, the capital of the island of Madeira (q.v.), situated on the south side of the island, is, in spite of its exposed harbour and unsatisfactory roadstead, the chief port and commercial town of the island. Pop. 20,606. It attracts a few hundred visitors every year by the salubriousness of its climate, and has a consumptive hospital, a cathedral, Anglican and Presbyterian churches, and an English club.

Function, the technical term in physiology for the vital activity of organ, tissue, or cell. Thus it is the dominant function of the pancreas to secrete digestive jnice, of a muscle to contract, of a sensory cell to receive and pass on oxternal stimulus. The classification of the various functions or vital processes presents considerable difficulty, though it is easy enough roughly to catalogue the most important: (1) contractility (by muscular cells, tissues, and organs); (2) irritability to sensory stimulus, transmission of nervous stimulus, 'automatic' origin of nervous impulse (by sensory organs, nerves, brain, &c.); (3) secretion and excretion (by glandular cells, or complexes of these); (4) respiration (hy skin, gills, lungs, &c., or necessarily in every actively living cell); (5) nutrition, digestion, assimilation (in the manifold ways in which the income of energy in the form of food is received and worked up into living matter). Somewhat apart from those, and of more

periodic occurrence, are the great processes of phenomena may be thus arranged in diagrammatic growth and reproduction. Or the various vital fashion:



In a single-celled organism, such as an Ameria, all the vital processes take place within narrow timits, and just because of the simplicity of struc-ture there must be great complexity of function compared with what occurs in a single cell of one of the higher organisms. For here division of of the higher organisms. labour is possible, and in the different cells special functions predominate over the others. Thus, a functions predominate over the others. Thus, a muscle-cell is contractile but not strictly nervous, and a glandular cell is secretory without being definitely contractile. With the division of labour and resultant complexity of structure in a higher organism, various functions appear which are only forcelladowed in a protozoou. Such, for instance, is foreshadowed in a protozoou. Such, for instance, is the circulatory function, establishing nutritive and respiratory communication between the distant parts. But such a multiple process can readily be seen to be the sum of several more fundamental functions. It must also be noted that, while a cell, tissue, or organ may have one dominant function, it may at the same time retain several sub-

Another fact of general importance is the change of function which may be exhibited by the same organ in the course of its history—that is to say, through an ascending series of animals, or even in the development of an individual. Thus, what is a mere bladder, of little apparent account, uear the hind end of a frog's gut, becomes the respiratory and sometimes nutritive Allantois (q.v.) of reptile and bird, and an important part of the Placenta (q.v.) in placental mammals. The importance of this in relation to the general theory of evolution has been emphasised by Dohrn in what he terms the principle of functional change.

Fundamentally, the functions of organs, the properties of tissues, the activities of cells, are reducible to chemical changes in the living matter or protoplasm. To the constant change in the protoplasm the general term 'metabolism' is applied, while this is again subdivided into processes of upbuilding, construction, chemical synthesis, or 'anabolism,' and reverse processes of down-breaking, chemical disruption, or 'katabolism.' See AMCEBA, BIOLOGY, CELL, PHYSIOLOGY, PROTOPLASM, and the various functions, DIGESTION, &c .- In speaking of disease, 'functional' is opposed to 'organic.'

Function. When two quantities are so related that a change in the one produces a corresponding change in the other, the latter is termed a function of the former. For example, the area of a triangle is a function of the base, since the area decreases or increases with the decrease or increase of the base, the altitude remaining unchanged. Again, if $u = ac^2 + bx + c$, where a, b, and c are constant quantities, and u and x variables; then u is said to be a function of x, since, by assigning to x a series

of different values, a corresponding series of values of u is obtained, showing its dependence on the value given to x. Moreover, for this reason, x is termed the independent, u the dependent variable. There may be more than one independent variable e.g. the area of a triangle depends on its altitude and its base, and is thus a function of two variand its base, and is thus a function of two variables. Functionality, in algebra, is denoted by the letters F, f, ϕ , Φ , &c. Thus, that u is a function of x may be denoted by the equation u = F(x); or, if the value of u depends on more than one variable, say upon x, y, and z, then by u = F(x, y, z). Functions are primarily classified as algebraical or transcendental. The former include only those functions which may be expressed in a finite number of terms involving only the elementary

number of terms, involving only the elementary algebraical operations of addition, subtraction, multiplication, division, and 100t extraction. Several terms are employed to denote the particular nature of such functions. A rational function is one in which there are no fractional powers of the variable or variables; integral functions do not include the operation of division in any of their terms; a homogeneous function is one in which the terms are all of the same degree—i.e. the sum of the indices of the variables in each term is the same for every term. For example,

$$x^4 + x^3y + x^2y^2 + xy^3 + y^4$$

is a rational, integral, homogeneous function of the fourth degree in æ and y. Transcendental functions are those which cannot be expressed in a finite number of terms; the principal types are (1) the number of terms; the filmeral types are (1) the exponential function e^x , and its inverse, $\log x$; (2) the circular functions, such as $\sin \alpha$, $\cos x$, $\tan x$, &c., and their respective inverses, $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, &c.

Functions are also distinguished as continuous or discontinuous. Any function is said to be continuous when an infinitely small change in the value of the independent variable produces only an infinitely small change in the dependent variable; and to be discontinuous when an infinitely small change in the independent variable makes a change in the dependent variable either finite or infinitely great. All purely algebraic expressions are continuous functions; as are also such transcendental functions as ϵ , $\log x$, $\sin x$, $\cos x$.

Harmonic or periodic functions are those whose values fluctuate regularly between certain assigned limits, passing through all their possible values, while the independent variable changes by a certain amount known as the period. Such functions are of great importance in the theory of sound, as well as in many other branches of mathematical physics. as in many other braches of mathematical physics. Their essential feature is that, if f(x) be a periodic function whose period is a, then $f(x + \frac{1}{2}a) = f(x - \frac{1}{2}a)$, for all values of x.

The term derived function is used to denote the successive coefficients of the powers of h in the expansion of f(x+h), where h is an increment of expansion of f(x + h), where h is an increment of x. If x becomes x + h, then f(x) changes to f(x + h), and it may be shown that $f(x + h) = f(x) + f'(x)h + f''(x)h^2 + f'''(x)h^3 + &c$; f'(x), f''(x), f''(x), &c are the first, second, third, &c derived functions of f(x). It is the primary object of the differential calculus to find the value of these for different kinds of functions.

Fund. Sinking. See Sinking Fund.

Fundi, or Fundungi (Paspalum ceile), a kind of grain allied to the millets, much cultivated in the west of Airica. See MILLET, PASPALUM.

Funds. See NATIONAL DEET.

Fundy, BAY OF, an arm of the Atlantic, separating Nova Scotia from New Brunswick, and branching at its head into two inlets, Chignecto Bay and Minas Basin, which are separated by narrow neeks or land from the Gulf of St Lawrence. It has an extreme breadth of 45 miles and a length up to Chignecto Bay of 140 miles; it receives the St John, the principal river of New Branswick, and the St Croix, which separates that province from Maine. The navigation is rendered perilous by the tides, which rush in with impetuous force, rising rapidly from 60 to 70 feet.

Finen, or FUHNEN (Dan. Fyen), the largest of the Danish islands after Zealand, is separated from Sleswick and Jutland on the W. by the Little Belt, and from Zealand on the E. by the Great Belt. With the islands of Langeland, Arö, Taasinge, &c., it forms the two administrative districts of Odense and Svendborg. Area of Funen, 1135 sq. m.; pop. (1880) 206,528. The coast is for the most part flat and sandy; on the north it is indented by the deep Odense Fjord. The interior is flat, except towards the south and west, where there is a range of hills rising to about 420 feet. The land, which is well watered by several small streams, is fruitful and watered by several small streams, is fruitful and well cultivated, producing abundant crops of cereals. Barley, oats, buckwheat, rye, flax, hemp, honey, horses, and a fine breed of horned cattle are exported. The island is crossed by several railway line. The principal towns are Odense (25,600 in 1885), Svendborg (7184), and Nyborg (5402).

Funeral Rites, the customs attending the funeral Kites, the customs attending the burial or other disposal of the bodies of the dead, the various practical methods of which are discussed under the article BURIAL. These ceremonies of conrec vary with the method preferred, whether of butial in the earth, exposure upon the tops of trees and towers as practised by the Parsees, or of burning in the usage of the ancient Greeks and later also the Romans. The effect of Christianity was to add a new sanctity to the body from the belief in its resurrection in a glorified form, hence the burial in places specially set apart for that purpose with more or less elaborate religious ceremonies, the washing, anointing, stretching, and swathing of the body in white robes (once in England only in woollens), the strewing of the coffin with palms and resemany rather than cypress, and its position in the grave with face upward and feet to the east, towards the second coming of the Lord. Nowadays towards the second coming of the Lord. Nowadays in Britain and America there are few distinctive customs beyond the religious rites, the wearing of black as a mourning colour, and the accompanying the body to the grave, expressive of respect; but formerly many customs were in use, as the ringing of the passing bell to drive off demons who might be in waiting for the newly-released soul; the constant watching with the demons who inight be in waiting for the newly-released soul; the constant watching with the dead betwixt death and burial—the *lykewake*— once universal, and still surviving, with degrading circumstances and without meaning, in the Irish

wake; setting a plate of salt upon the breast of the body and lighted candles at its head; and the serving of profuse repasts of meat and drink to all and sundry, as well as special doles of food and elothing to the poor. Andrey in his Remaines of Gentilusme and Judaisme tells us of a singular enstom as having been formerly practised in Herefordshire, of a man eating a loaf of bread and drinking a bowl of beer over a dead body, and thereby symbolically taking upon himself the sins of the deceased. The analogy is obvious between the sin-cater and the scapegoat of the ancient

Jewish Day of Atonement.

Funeral rites symbolise affection and respect for the deceased and gricf for his loss, or they may be attempts to deprecate the ill-will of a now power. The belief in the continuance of life beyond the grave is a universal human possession, and most savages attach ghost-sonls also to animals and even inanimate objects, which may accompany the souls of men into the spirit world as in life, Hence the meaning of the North American Indians burying bow and arrow with the dead, the old Norse warrior having his horse and armour laid beside him in his barrow, the Hindu widow's in-veterate desire to be burnt herself to death together with her husband's body, the head hunting of the Dyaks in order that a man may not be unprovided with slaves after his death, the burying of money together with the corpse and even the obolus for Charon's fee among the ancient Greeks, as well as such a survival as our own leading the trooper's lorse belind his master's bier instead of burying him in his grave.

The funeral rites of the ancient Egyptians were most elaborate, but it is scarcely safe to claim their preference for embalming as conclusive proof of their belief in a resurrection of the body, as they embalmed animals as well as men, and did not preserve some of the most important internal parts

of the human bodies they embalmed.

See the articles Ancestor-Worship, Burlal, Egypt, and Embalming; for the religious significance of funeral rites in Herbert Spencer's theory of rolugion, his Principles of Sociology, but for a safer guide to interpretation, Tylor's Primitive Culture (vol. ii.); also for the facts, Feydeau, Hist. générale des Usuges fundères et des sepuiltures des Peuples aneuns (3 vols. Paris, 1838); De Gubernatis, Storia popolare degli usi funchri Indo-Europai (1873); Tegg, The Lust Act (1876); and Sonntag, Die Todtenbestatung (1878).

FUNERAL EXPENSES, in Law. If limited to the degree and quality of the deceased and the estate he has left, funeral expenses are a privileged debt, allowed before all other debts and charges, both in England and Scotland. If the parties primarily liable neglect the duty of giving decent burial to the dead, a stranger may do so, and claim reimbursement out of his effects. In Scotland it is held that moderate and suitable mourning for the widow and such of the children of the deceased as were present at the funeral is a valid charge; but the reverse is the case in England, it having been decided that the widow has no claim for mourning either against the executor or the creditors of her husband.

Fiinflaus, a suburb of Vienna lying SW. of the city. Pop. (1880) 39,967, principally engaged in weaving, wood-turning, and building.

Finfkirchen ('Five Churches,' from five mosques built during the Turkish occupation, in the 16th century; Hungarian, Pecs), a free town of Hungary, capital of the county of Baranya, on the vine-clad southern slope of the Mecsek Mountains, 139 miles S. by W. of Pesth by rail. Its bishopric was founded in 1009, and it is one of the oldest, as well as one of the most pleasantly situated and beautiful towns of Hungary. It formedly concerned beautiful towns of Hungary. It formerly possessed

FUNGI 35

a university. The most important of its buildings are the Romanesque cathedral (1136), the bishop's palace, the town-house and hospital, and the county buildings. Its manufactures include leather, woollens and flannels, oil, brandy and liqueurs, and a fanned majolica ware; it produces wine, fruit, and tobacco, and has coal-mines and marblequarries, and a flouri-ling trade in hogs and gallnuts. Pop. (1881) 28,801.

Fungi. The early botanists 'considered the fingi to be lusus nature and no plants at all,' and regarded their strange and fitful appearance without flower or apparent seed as the strongest argument for spontaneous generation. The bland wholesomeness of some, yet frightful poisonousness or destructiveness of many others, with their consequent world-old association with that crude and fanciful pharmacy in which ancient medicine and witcheraft were so inseparably intermingled, not a little cuhanced these mysteries. Hence, although in Sterbeeck's Theatrum Fungorum (1675), the first published book entirely devoted to cryptogamic plants, there is an excellent account and many figures of fungi, it was not, and indeed could not be, until after that primary task of natural science initiated by Lincount and could be a controlled by Lincount and could be a controlled by Lincount and controlled the Lincount and controlled initiated by Linneus-the compilation of the 'System of Nature,' the orderly descriptive catalogue of natural things—had made considerable progress in almost all other directions, that its chapter dealing with the fungi was fully connected. From alout 1780 onwards we have illustrated cryptogamic floras essentially of the modern type, which not only soon reached tolerable completeness for the more abvious forms, but with the introduction and improvement of the microscope even made rapid progress with that description of the multifarious minor forms which is even now far from ended. It thus became known that some were produced from reproductive cells or spores, just like a plant from its seed; hence for this Linnean school, whose central monument is the works of Fries, each new form was, naturally enough, simply a new species to be described. The identification, however, of the fern and its prothallus (see Fenns) as phases of a single life-history, and the thorough reinterpreta-tion of the higher cryptogans and their unification with the flowering plants thereupon effected by Hofmeister, naturally gave a fresh impetus to the study of the remaining lower groups of alga and fungi. For fungi, this new movement was headed by Thlasne, who from 1851 onwards showed that many of the different form-species hitherto described were actually nothing more than the phases of a single protean life-history. Tulasne essentially relied upon the actual anatomical continuity of different adult forms, upon finding reproductive structures hitherto regarded as specifically distinct on one and the same vegetative body or mycelium; while De Bary confirmed and extended these results by the complementary method of cultivation from the spore. Tulasne's new doctrine of 'the pleomor-phism of the fungi' aroused storms of controversy; but the bigated conservation of the systematists in the defence of their results, and the exaggerated speculation and practical blundering of the younger school in the reinterpretation of them, gradually subsided as the just claims of each obtained mutual recognition; and thanks to many workers, but especially to the exact labours of De Bary and his many pupils, the classification and morphology of fungi have thereafter been in harmonious progress.

It was long before any satisfactory definition of fungi was possible, their association with algae (themselves scarcely better known) at first resting merely upon the negative characters which excluded both from the higher plants. Their physiological peculiarities, however, were more apparent; and their definition as a 'natural order' (or, as it

gradually appeared, a vast class) was accepted as 'embracing all Thallophytes which do not vegetate by means of intrinsic chlorophyll.' The progress of research demonstrated the remote distinctness of some types of these from others, and the intimate relationship of certain fungi to particular algae of which they seemed to be merely the colourless forms. Hence it was argued, especially by the physiologist Sachs, that such forms were no more entitled to separate classification apart from the algae than were the very various types of flowering plants—e.g. dodder and broom-rape—which merely agree in having lost their chlorophyll through parasitism, apart from the ordinary green plants to which they are respectively akin. Abandoning, then, the physiology of the vegetative system, he proposed a classification of the algae and fringi according to their degree of reproductive development (see ALG.E.). This was, however, going too fur, and systematists have returned to the more conservative proposals of De Bary, who excludes entirely from the iningi the Bacteria (q.v.) and the Myxonyectes, and, while recognising that certain fungi are doubtless merely the colourless representatives of particular algal groups, yet vastly simplifies the subject by insisting upon 'an Asconyectous series or main series of fungi, albeit with more or less doubtfully related outlying forms.

At the outset of this great series are usually described two orders (sometimes united as Oomycetes), both closely related in vegetative and reproductive type to such simple algae as Vaucheria (see ALGE). These are the Peronosporeæ, including such well-known moulds of living plants as Phytophthora infestans (Potato Disease, q.v.), Cystopus candidus (White Rust of cruciferous plants), also Pythium and Peronospora. The allied Saprolognia (see Salmon) gives its name to the other family.

the other family.

Of the Zygomycetes the commonest type is Mucor muccilo, the common white mould of dead

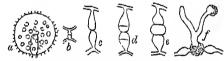


Fig. 1.—White Mould (Mucor muccdo):

a, ripe sporangium with few spores represented to show internal septami ingrown as columella; h, beginning of conjugation between two adjacent hyphic; e, d, e, later stages of the process; f, germination of the thick-walled resting spore, with short vegetative and immediate reproductive hypha.

organic matter, particularly horse-dung, a form easily cultivated and in every way peculiarly suitable for beginning the study of fungology. Starting with a spore, this germinates into a filament or hypha, which remains nnicellular like that of the preceding forms, and grows and branches rapidly through the nutrient material or solution, the whole growth of hyphæ being termed the mycelium. Soon erect hyphæ begin to bud from the older hyphæ of the mycelium; the tips of these enlarge into spherical heads, which become separated off as distinct cells, the future sporauginm, by a partition which grows, however, inwards, into the interior of the enlarging spherical head, as the columella. The protoplasm of the sporangium is meantime dividing into a multitude of tiny cells, which surround themselves with cell-walls as spores, while the mineral waste products of this active change are deposited in the common sporangial wall, rendering it exceedingly brittle. This readily breaks, scattering the spores, which immediately recommence the

Sooner or later, however, a more evolved process

FUNGI 36

of reproduction is needed, and two adjacent hyplice of reproduction is needed, and two adjacent in pace conjugate much as in Spinogyra (see fig. 1, b-c, and ALC.E. fig. 4). The resultant aggospore after a period of rest germinates with only a radimentary investion, and immediately reproduces the characteristic manufacturing. acteristic asexual sporangium. Empusa, of which E. museu is largely fatal to honse-flies in autumn, The Chytridiaceae are an order of minute fungi of which the life-history is fundamentally similar to

which the fire-instory is indicated and the that of the Protococcace among algie.

The Ustilaginer are a large family, parasitie on phanerogamous plants. Their mycelium ramifies through the intercellular spaces of the host, and forms also den-ely-woven masses of spore-bearing lyphie, which show various degrees of differentiation as compound sporophores, so foreshadowing those of higher funci. These spores produce a short myceliam, of which the branches conjugate in pairs, while the new mycelia thereafter arising re-enter the plant and in time produce new asymal spores. Some are formidable pests of agriculture (Ustilago, Tilletia).

ASCOMYCETES proper.—The myceliam is always composed of multicellular hyphic, which in the higher forms interweave into the stroma or thallus, which assume various characteristic forms and bears the short reproductive hyphre, which in turn bear the spore-mother cells or asci. These are usually tubular, and on reaching full size their protoplasm collects at the top, and the nucleus

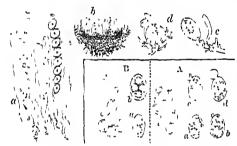


Fig. 2.—Peziza. rig. 2.—Fezza.
c., aset, with barren thaments
(paraphysis); b. section of
interincation surface (hybris(ri)); (preparations for the
sexual process which procedes
the development of the funaliss buyd, dettilization, with
upgrowth of an enveloping
tissue, the morphent sporocare.

Fig. 2a.-Yeast (Saccharomyces cercrisice): $\{x, e, b, e, d, \text{carly stages of bud-} m_{\mathfrak{C}}; e, \text{laterstages}; b, \text{starved yeast cell, dividing at } a \text{ to ion four iscospores at } b; e, \text{subsequent germination on return to nutritive fluid.}$

divides repeatedly, usually producing eight nuclei, which collect protoplasm around them, and, developing cell-walls, become perfect accospores. In all save a few of the lowest forms (Eremascus, Exoascus, Xe., which are accordingly grouped as Gymnoasci) the fructification is in distinctly developed sporocoops. In these, besides the accogenous hyphæwith their asci, there is an envelope derived from distinct hyphæ of the stroma, which also send in amongst the asci a multitude of barren filaments, the puruphyses. The aggregate of asci and paraphyses is termed the hymenium (see fig. 2, a, b). Tulasne and De Bary have shown with tolerable certainty (despite the doubts of Van Tieghem and divides repeatedly, usually producing eight nuclei, certainty (de-pite the doubts of Van Tieghem and certainty (despite the doubts of Van Tiegnem and Brefeld) that the whole fructification arises in consequence of a conjugation of similar hyphre in the lowest forms (Eremascus), or the sexual union of dissimilar ones in higher forms (e.g. Peziza, fig. 2, c, d).

A brief systematic enumeration of the orders and leading illustrative forms of Ascomycetes will be found of service.

be found of service :

(1) Gymnoasci.—Asci not forming definite sporocarps with envelope (Eremascus, Exoascus).

(2) Discomycetes (800 species).—Sporocarp with (2) Discomycetes (800 species).—Sporocarp with envelope, but hymenium completely uncovered, at least at maturity. The most important genus is Peziza, of which the shallow cup-like sporocarp is open from the beginning, though in the allied Ascobolus the envelope encloses the hymenium during development and bursts, scattering the spores. Bulgaria resembles this, but is gelations. In Dermatia the cun is leathery or horse. To In Dermatia the cup is leathery or horny. In Stictis the hymenium is almost withdrawn into the stroma, while in Phacidinm the sporocarp only the stroins, while in Friedman are sprotectly only breaks out and opens when ripe. In a second but less important family the sporocarps are leathery and black, elliptical, linear, or winding; of these Hysterin the commonest is Rhytisma accrinum, which forms the large black spots that appear upon almost every leaf of the common maple towards automn. The Helvellacei represent an opposite type of development; the large sporo-carps are stalked, with club or hat shaped hymenia, open and uncovered by the envelope from the beginning. Many are important as esculent, notably the morels (Morchella esculenta, deliciosa, &c.), also Helrella esculenta. The mycelium of Rasleria hypogra, found on dead and diseased vine-roots, is the 'pontridic de la vigue' of wine-growers.

Among the Discomycetes the life-history is often Among the Discomplex by the inycelium constricting of acrospores from the tips of creet filaments, these acrospores readily reproducing the mycelium. This stage of Peziza Fuckeliuma was formerly known as Botrytis cinera; and many other acrospores. spore bearing moulds still await similar identificaspore bearing moulds still await similar identinea-tion. Vegetative hyphrealso frequently interweave into dense resting masses or selevotia, as also in the species just named, and those may either re-develop aerospore-bearing hyphre or (after a winter) give rise to true hymenial cups. Aerospores, too, may be developed either upon isolated hyphre or in pseudo-hymenial groups, which may be open or flask-shaped (ppenidia). Nor are the many possibilities of 'pleomorphie' variation thus opened up by any means confined to the Discomycetes.

(3) Pyranonycetes.—This is a large order of small

and inconspicuous fungi, in all respects representing a further differentiation of the Discounycete type, primarily in the deepening of the shallow cup-shaped hymenium into a deep flask with minute apical opening (perithecium), but also in a more varial daydon to the cup of the cu varied development—the most extreme among fungi of pleomorphism or alternation of generations, The number of species is hence very uncertain. Besides the important Ergot (Claniceps purpurea, see Ergor), and its curious ally Cordycops, which attacks caterpillars, moths, wasps, &c., with its fructification, thus forming the extraordinary 'animal-plants' and 'vegetating insects' which so perplexed the early naturalists, any of the common forms into which the old (and once allcomprehensive) genus Spharia has been broken up will serve as type, conveniently Neghria, common in red patches upon dead wood. Some form parasitic patches within lichens.

(4) Perisportacew.—In these the perithecia aro completely closed capsules which fall to pieces on ripening; there are no paraphyses. The mycelium is thread-like, and acrospores are frequent. Of the 100 species some are notable pests, witness Erysiphe and others company and others, commonly grouped as Mildew (q.v.), Oidium Tuckeri, a pestilent vine disease, &c. Easily distinguished by the dark or inconspicuous mycelium are the species of Funago. To this mycelium are the species of Furnago. To this group also helongs Enrotinm, of which the common Bread Mould (E. Aspergillus-glaucus) is a type commonly put before the botanical student, from the comparative facility with which the sexual process, which sets in after prolonged multiplication by acrospores, can be observed, with its resultant

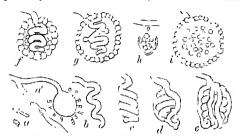


Fig. 3.—Eurotium Aspergillus-glancus: a, a germination of spore in three phases; a, head of reproduc-tive hyphic-bearing spores; b, c, appearance of comparing filaments; d, c, growth of enveloping coat, complete in f; a, first appearance of asci (two binds); h, a ripe ascus; i, spores lying loose and ready to be set free.

development of the perithecium and its asci (see

(5) Tuberacci.—In this group, as in the preceding, the hymenium is permanently without external opening, but the chambers become narrow, coiled, and the whole complex sporocarp Most are thus attains an extreme complexity. subterranean, and are best represented by the important genus Tuber (see Truffle). With this (or sometimes in the last group near Elaphomyces) is to be reckoned the very common monkl of jam, bread, &c. (Penicillium glaucum); it rarely, however, attains full development beyond the acrosposal provide from the second s spore-bearing form.

(6) Lichenes.—As the majority of lichen-forming fungl belong to the Ascomycetes, the lichens are very commonly now described under this head by recent writers. Yet not only the time-honoured distinctness of this group, but its remarkable variety and interest make separate treatment still

expedient, hence see Lichens.

Besides the large number of forms in which the existence of an aerosporous phase as yet rests upon analogy alone, De Bary reckons as 'doubtful Ascomycetes' such forms as Laboulhenia, Exoascus, and also the important species which excite alcoholic fermentations, Saccharomyces (fig. 2a). See YEAST, FERMENTATION.

From forms in which the characteristic mode of reproduction of the Asconycetes is only doubtfully represented we readily pass to those in which it does not appear at all, but in which multiplication next the street of the street termed an acidium, so closely resembles that of an Ascomycete as to induce De Bary and most writers to reckon it with these rather than with the follow-

ing series.

(7) The Uredinew or Ecidiomycetes.—These are the Rust flugi, a remarkable series of parasitic moulds, formerly associated with the Ustilaginea, which they somewhat resemble in habit, but from which they differ in structure and life-history. The alternation of generations is remarkably complete and well differentiated, the different forms laying constantly been reckoned in distinct genera, which are as yet by no means fully criticised. The most familiar case is that of the Rust of wheat (Puccinia graminis), in which the generation found on the barberry was described as Ecidium berberidis. other important forms are known as *Uredo* sp. &c.; to this group is also reckoned the coffee disease of Ceylon, *Hemileiu vustatrix*. The life-history of the group will be understood by reference to Rust.

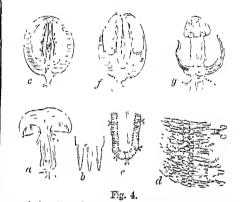
BASIDIOMYCETES. - We now come to the Basidiomycetes proper, which derive their name from the basidia which segment off or 'abjoint' the spaces (fig. 4, d). These are usually non-parasitic and have generally large and well-developed sporocarps; they are divided into two main groups.

A. HIMENOMYCETES .- Hymenium exposed upon

the surface of the sporocarp.

(a) Tremellini.—Gelatinous with basidia each bearing only one spore, often arising laterally—Amicularia (Jew's Ear), Tremella (q.v.).

(b) Hymenomyertes proper, not gelatinons, two to six spores arising on each basidium (fig. 4, a-d).



a, vertical section of an again (Hymenomycetes); b, section of three 'gills;' c, section of the of gill, showing course of hypho-bearing basida, of which the bear spotes; d, portion more highly magnified; e, young Phallus (tasteromycetes); f, the same at moment of ruptine of peridum; g, more fully opened (the same figure on a smaller scale).

In the simplest forms the sporocarp is erect or branched, and bears a hymenium over its whole surface. Of this small group of (1) Clavarinei many species of Clavaria are common,

(2) In the allied Thelephorei the hymenium forms also a simple smooth surface, but is restricted either to the upper or under surface; in the latter case the fungus may be sessile or stalked, and have a distinct hat or pileus (Thelephora, Stereum, &c.).

(3) In the Hydnei the hymenium becomes differentiated in various irregular and discontinuous forms, which may be warty, bristly, or comb-like.

(4) In the Polyporei the hymenium is continuous,

(4) In the Polypore the hymentum is continuous, but with many more or less tubular depressions. Here belong several important genera, notably Boletus (q.v.), Polyporus (see AMADOU), Fistulina (q.v.), as well as the postilent Merulius lachrymans (Dry Rot, q.v.).

(5) In the immense group of Agaricini (1200

European species) the series culminates, the hymenium being arranged in regular radiating lamella or gills. Most important of course is the genus Agaricus and Mushroom (q.v.), which is broken up into many subgenera (Amanita, Armillaria, &c.). Cortinarins, Hygrophorus, Russula, Lactarins, Coprinus, Cantharellus (chantrelle), Marassirio or a krimentant. mins are also important. Many of these are edible, others again poisonous.

B. GASTEROMYCETES.—Here the spores arise quite as in Basidiomycetes; but the hymenia are completely enclosed within the fungus-body. Of this the outer layer (peridium) becomes differentiated from the deeper substance (gleba). Both layers may undergo very remarkable histological and anatomical modifications, and these changes of ripening often result in the sudden acquirement of the most extraordinary forms. Hence, although the species are by no means so numerous (about 550), there are 70 genera. These are mostly large fungi,

FUNGI 38

often edible, at least in the young state; few are positively poisonous.

(1) Of the mostly subterranean and truffle-like Hymenogastrei, one genus, Gautiera, affords an interesting transition from the Hymenomycetes, it-hymenial depressions remaining open and uncovered by any differentiated perdiam. In the covered by any differentiated perdiam. In the remaining types (Hymenogaster, &c.) the gleba contains many closed internal hymenial chambers, but remains continuous with the simple peridial coat

(2) The Selerodermei differ little from the preceding, save in the more differentiated peridinm, from which the globa dries away in a brittle network, lining the chambers, which become filled with spores. Seleroderma rulgare is sometimes used as an adulterant of truffles, but is commonly regarded

as inclible.

(3) In the simplest Lycoperdinci or puff-balls the gleba may remain unchambered, but the tissue of the gleba usually breaks up into a woolly mass of the glent relative breaks in fifth a woody mass of dried hyphae; bence the peridium when broken on thening discloses a dusty mass of threads and spines (Lycoperdon, Bovista). See PUTF-BALL.

(4) In another series, the Phalloidei in the

widest sense, we have a very singular series of forms. This begins with the simple earth-star (Geaster), which is essentially a puff-ball with outer and inner peridium, of which the outer opens into radiating lobes. In Batarrea, the gleba, covered with the inner peridium, becomes raised upon a long stalk; in Thalirs (see fig. 4, e, f, g) the outer perddium, fibrons outside, becomes gelatinous within, while the stalk pushes the gleba through the inner peridium also, as a naked cap from which the spores drop away; while in Clathrus it is the inner peridium which

while in Clathrus it is the inner peridium which expands as a large network.

(5) In the last series, that of Nidulariei, the external peridium opens, disclosing several separate 'peridioles,' each containing a hymenial tissue, which breaks down into a mass of spores. These are the 'bird's nest fungi' (Cyathus, Nidularia, &c.). The origin of the Gasteromycete sporocarp from its mycelium appears to be without any sexual process, but by a process of direct growth and differentiation of an upgrowth upon its mycelium. In Hymenomycetes a sexual process has been sometimes described, but not with absolute certainty. We know, however, how constantly the abundant nutrition of an organism leads to the relapse from

nutrition of an organism leads to the relapse from sexual to asexual multiplication.

As an appendix to this ontline of classification, it is necessary to note that we not unfrequently find sterile mycelium forms, to which any definite systematic position frequently cannot be given. Such are, for instance, the well-known Racodium cellare of wine-cellars. There has been much dispute over the nature of the complex strands of Rhizomorpha, now regarded as belonging for the most part to Agarience mellages while the old course. most part to Agaricus melleus, while the old genns Sclerotium has long been recognised as a resting

state of many diverse forms-e.g. Ergot.

Germination.—Most spores are capable of immediate germination: such are most acro-pores (gonidia), almost all acrospores, and most spores of Hymenomycetes. Some, however, require a period of rest: such are most ospores, zygospores, winter spores, &c. Although some spores perish almost immediately, many others exhibit considerable powers of resistance to heat, cold, drought, &c.; powers of resistance to near, coin, drought, etc.; those of some months have been germinated from herbarium specimens three to ten years old. For germination we require a reasonable temperature, varying with the species, with supply of oxygen and moisture; nutritive matter may also be necessary. Many spores, however, have never as yet been observed to germinate at all, notably those of the truffle and some other Ascomycetes, of most

Gasteromycetes, and of a few Hymenomycetes, including even the common muslroom.

including even the common mushroom.

Nutrition and Mode of Life.—The characteristic absence of chlorophyll renders the fungus unable to decompose earbonic anhydride. Hence it must depend upon organic compounds already formed. Almost any soluble carbon compound, not too poisonous or too fully oxidised (such as formic or oxalic acid, urea, &c.), will, however, serve for this, and similarly with most nitrogen compounds, area urea. The constituents of the ash can also be even urea. The constituents of the ash can also be obtained from a wide range of substances. Penicilliam grows best in a solution of proteid (peptone) and sngar, yet can be grown, of course with diminishing vigour, upon a whole series of poorer solutions, down to ammonium acctate. All of course give off carbonic acid in respiration, and a few are remarkably phosphorescent.

Such facts help us more clearly to understand the wide range of habitat presented not only by the different members of the group, but by the same species. Those fungi which normally obtain their organic matter from the dead organic matter of decaying bodies are termed suprophytes, while those which obtain them from living plants or animals are termed parasites. The former is doubtless to be regarded as the primary state of things, and includes the great majority of fungi, yet many normal saprophytes exhibit 'facultative parasitism,' and conversely normal parasites may exhibit 'facultative saprophytism.' Many saprophytes require a specific substratum—e.g. dung, feathers, &c.—just as many parasites have only a single host; others again have a very wide range of habitat. The chemical effects of the growth of fungi, with which, for physiological purposes, we may also reekon the Bacteria (q.v.), upon organic substances are ontlined under PERMENTATION and PUTRE-FACTION. The relation of specific parasites to their hosts, besides mention in the various special articles, such as ERGOT, MILDEW, and RUST, is more generally treated under PLANTS (DISEASES OF) and PARASITISM; the pathological bearings come under GERM THEORY and PATHOLOGY. That remarkable adjustment of fungus and host which rises beyond the pathological level into the healthy and permanent mutual adaptation known as symbiosis is described, for the association of fungus and alga, under Lichens, and for that of fungus-mycelia with the roots of phanerogamous trees, the

Uses of Fungi.—Of species used in medicine, the only one now of importance is Ergot (q.v.): the narcotic use of the Siberian fungus has also been described and a superference of the Siberian fungus has also been described and a superference of the Siberian fungus has also been described and a superference of the Siberian fungus has also been described under AMANITA. Amadou (q.v.) and Moxa (q.v.) are old sources of tinder, and Polyporus squamosus, cut in slices, was much used for razor-strops. But the chief use of fungi is for food,

razor-strops. But the enter use of rungi is for foou, and in the manufacture of Ketchup (q.v.).

Although few fungi are used as food, and most popularly regarded as poisonous, the positively dangerous species are really by no means very numerous. Yet the risks of incautious gathering must not be understated, since not only are some edible fungi liable to be confounded with poisonous forms, but some normally wholesome forms acquire poisonous properties under particular circumstances, although whether this be due to definite variation or to the chemical changes of incipient decomposition remains doubtful. Hence our common mushroom is excluded from the Italian markets. There is no eertain rule which can superscde the need of experience and caution in discriminating wholesome from unwholesome forms, the popular beliefs—e.g. that the latter only will discolour a silver spoon if stirred with it while being cooked, or that they are more readily deliquescent—being without foundation. tion. Nor does colour or odonr afford any certain

test, for, although most forms of gaudy exterior or readily changeable internal colour may be suspected, and all fetid ones of course avoided, some pectent, and an ferm ones of course avoided, some poisonons ones are quite inconspicuous and inoffensive. Again, some which are pungent and acrid while raw become bland and wholesome when cooked; maceration in vinegar or brine pro-

duces a similar effect.

The importance of fungi as an article of diet is naturally minimised in Britain through the prevailing ignorance and the consequent excessive distrust; in France, and especially in Italy, they are of much greater importance. The culture of the Mushroom has, however, of late years become increasingly frequent, while on the Continent that of a number of other species has long been practised with more or less success, as notably of Agaricus, Boletus, &c., and more recently of the truffle. The leading chible fungi have already been noted, and are also in most eases the subject of separate articles; it may suffice therefore here to bring together the most important. Besides the Mashroom, its immediate congeners, and its closer allies, such as the Chantrelle (Cantharollus abarius), we have among the Hymenomycetes a number of species of Boletus and of Polyporus, also minter of species of botens and of Polyporus, and Fistulina heputiva, and several species of Lactarius, Hydnum, and Clavaria, with Marasmius oreades. Among Gasteronycetes, the puff-halls (Lycoperdon, Bovista), in the young state. Of Ascomycetes, the Morel, Helvella, with Verpa, some of Peziza, &c., and, of course, above all others, the Truffle. Cyttaria Darwinii, which grows on beeches in Tierra del Fuego, forms an important article of native diet.

Poisonous Effects and Treatment. - Noxious species may produce sometimes irritant, sometimes narcotic effects. The effects appear soon after the meal, and may be manifested by giddiness, dimness of sight, and debility. The person may seem intoxicated, and there may be singular illusions of sense, while even spasms and convulsions may appear in the most serious cases. In most cases, however, recovery takes place, especially if vomiting be early induced. Hence emetics should be administered as promptly as possible, and easter-oil also given freely.

For general accounts of fungi, see the leading text-books of botany, notably Goebel's Outlines of Classification (Oxford, 1887), and those of Van Tieghein and Luorssen; or, very conveniently, Bennett and Murray's Cryptoganic Botany (Lond. 1889). The central work is De Bary's Comp. Morphol. and Biol. of Fungi, &c. (Eng. trans. Oxford 1887). Systematic information must be sought in Comp. Morphol. and Biol. of Fungi, &c. (Eng. trans. Oxford, 1887). Systematic information must be sought in works such as Saccardo's Sylloge Fungorum, and the various cryptogamic floras, such as M. C. Cooke's Handbook of British Fungi (2d ed. 1871), his Illustrations of British Fungi (2d ed. 6 vols. 1884-88), or Stevenson's Mycologia Scotica and Hymenomycetes Britannici. Leunis, Synopsis der Phanzenkunde, vol. iii., is also of servico. For esculent fungi, see Badham, Esculent Funguscs of England (1863); W. G. Smith, Mushrooms and Toadstools (1879).

Fungibles are movable effects which perish by being used, and which are estimated by weight, number, and measure, such as corn, wine, money. Things are fungible when their place can be adequately supplied by other individuals of the same class, as where a sum of money is repaid by means of other coins than those in which it was received. Thus, jewels, paintings, and works of art are not fungibles, because their value differs in coal, individual of the process without pressent in coal, in the process without pressent in the process without pressent in the process of the process without pressent in the process of the process without pressent in the process of the pro in each individual of the species without possessing any common standard.

Fungus (Lat., 'a mushroom') is a term applied in pathology and surgery to expberant granulations or ulcerating tuniour-growths when they project somewhat in the form of a mushroom above the surface of the skin or nucous membrane where they are situated. The conditions giving also w this appearance occur especially in connection with the testicle and the brain. Tumours in which it occurs are frequently cancerons. The name also occurs in pathology in its true botanical sense; for Actinomycosis, Favus, Ringworm (q.v.), &c. are produced by parasitic fungi.

Fungus Meliteusis. See Cynomorium.

Funkia, so called after a Prussian botanist and herbalist (1771-1839), and sometimes known in English as Plantain-lilies, a genus of Liliaccæ allied to the day-lilies (Hemerocallis). Since their introduction from China in 1790, the five or six species have been largely and increasingly cultivated, not only in greenhouses, but in shrubberies and borders or rockwork, on account of the remarkable beauty of their masses of large broadly ovate or cordate, often variegated leaves. They are easily propagated by division of the tuberous erown, and thrive best in deep soil well manured.

Funny Bone is really the ulnar nerve, which is in most persons so little protected where it passes behind the internal condyle (the projection of the lower end of the humerus at the inner side) to the forearm, that it is often affected by blows on that part. The tingling sensation which is then on that part. The tingling sensation which is then felt to shoot down the forcam to the fingers has

given rise to the name.

Fur. See Furs.

Fur is the term applied to the incrustation which is formed in the interior of vessels (teakettles, boilers of steam-engines, &c.) when calcareous water has been for a considerable time boiled reous water has been for a considerable time boned in them. Many spring waters contain carbonate of line held in solution by carbonic acid. When this water is boiled, the acid is expelled and the carbonate is deposited, often in association with a little snlphate, forming a lining more or less coherent upon the sides of the vessel. In steam-boilers this way he meanted by the addition of a small this may be prevented by the addition of a small quantity of sal-ammoniae (ammonium chloride) to the water; carbonate of ammonian chorder to the water; carbonate of ammonia is formed and volatilised, while chloride of calcium remains in solution. This chloride, however, attacks the iron more or less according to its quantity and the other saline constituents of the water; therefore many substitutes are offered, some patented, some sold as secret preparations. The carcass of a pig that has died of disease has been found effectual. It appears to act by greasing the particles of carbonate of lime as they precipitate, and thus forming a loose and easily removable powder instead of a coherent deposit. Any other refuse fatty matter may be used for this purpose. The writer strongly recommends this simple mode of treatment, combined with frequent cleansing.

Furfuramide is closely related to Furfurine and Furfuron, and all three substances may be prepared from wood. When this is heated with water under pressure for some time, and the resulting liquor distilled, furfurol, $C_5H_4O_2$, an aromatic oil, with an odour resembling cinnanon and bitter almonds, is obtained. By treatment with annuous this is converted into furfuramide, $C_{15}H_{12}N_2O_3$, a neutral erystalline body. By boiling this again with a solution of potash, furfurine, an alkaline base having the same composition as, and isomeric with, furfuramide is produced. These substances are of little industrial importance.

Furies. See Eumenides.

Furloug (i.e. a furrow long), a measure of length, the eighth part of a mile or 220 yards.

Furlough, a military term signifying temporary leave of absence from service. Non-commissioned officers and private soldiers on furlough must be provided with a pass, or they are liable to be seized and dealt with as deserters.

Furnaces. Furnaces perform one of the most important of functions, and on them largely depend the power and economical efficiency of the steam-engine. Great care and skill, combined with an intimate knowledge of the laws which with an intimate knowledge of the laws which regulate combustion, must be exercised in the designing and construction of furnaces for steambodiers. They may be considered as divided into three parts. (1) The fire-chamber, where combustion begins, the finel is split up into its constituent gases, and the remainder consumed. (2) The combustion-chamber, where combustion of the gases is completed, and the heat applied. (3) The arrangements for the supply of air, and its mixture with the heated gases. In the combustion of fuel there are two leading conditions to be observed. there are two leading conditions to be observed—viz. to obtain as complete combustion of the fuel with as little waste of heat as possible, and to apply as much of the heat as is practicable to those parts of the boiler where evaporation will be greatest. These two conditions are somewhat difficult to realise in a furnace, and, while the best method of applying heat is well known, the portion available out of a given quantity bears but a very small proportion to what is lost or wasted under small proportion to what is lost or wasted under the most favourable circumstances. The supply of air is a most important factor; too much has the effect of chilling and diluting the gases, reducing the temperature of the furnace, and diminishing the force of the draught; while too little causes the gases to escape unconsumed, and results in great waste. The proper supply of air is therefore a very difficult watter to account the supply of great waste. The proper supply of air is energine a very difficult matter to accomplish, especially when there is an ever-varying demand for it, as is the case with solid fuel. Liquid or gaseous fuel does not present the same variation. It has

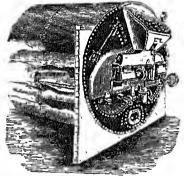


Fig. 1.

been found that the best effect is obtained from furnaces with forced draught—i.e. sending a steady flow of air under pressure through the incandescent fuel by means of a fan or other mechanical contriv-ance. With the ordinary chinney draught, the heated products of combustion must be allowed to escape at a high temperature, say 600°, and at a speed of about 30 feet per second, in order to maintain an effective draught. With artificial draught, the heat can be retained in the furnace a much the near can be remined in the furnace a much longer time, and a balance established between the pressure of the atmosphere and the heat inside. Also the waste heat, instead of rushing away at great velocity, may be made to do work in heating the air for the furnace or the feed-water for the holler; and is thus allowed to escape only when the art for the turnace or the feed water for the holler; and is thus allowed to escape only when deprived of its power of doing useful work. The difference in efficiency is said to exceed 25 per cent. in faveur of artificial draught.

furnaces varies greatly, and shows the power that forced draught gives. A land-boiler furnace burns about 14 lb. of coal, a marine furnace 16 to 24 lb., and a locomotive, with the draught increased by the escaping steam, from 80 to 200 lb. on the square foot of lire-grate in one hour. The great objects to be desired in furnace management are the exact apportionment of air to the varying wants of the fuel, so as to convert all the carbon to carbonic acid and the hydrogen to water, an equal and high temperature of the furnace, and that the grate-bars be always covered with fuel. Granted these conditions, and we obtain the best effect from conditions, and we obtain the best effect from the furnace, without smoke. Smoke may be caused by too much as well as too little air, especially with a low temperature in the furnace. Too much air reduces the heat of the furnace and gases below the temperature for combustion, and so smoke is formed. The same result comes from a deficient supply of air to take an all the carbon a portion of which escapes as up all the earlien, a portion of which escapes as

smoke. At the same time, with a high temperature in the furnace. insufficient air does not cause smoke; carbonic oxide instead of carbonic acid is formed, and one half of the heat is wasted. In practice, deficient boiler power is a fertile cause of smoke, from having to urge the fire beyond its capacity. Self-feeding furnaces are more economical and efficient than which are fed by hand, Fig. 1 shows one of A the most successful. A large hopper fixed in front of the hoiler contains a supply of fuel for a stated further attendance until its contents are consumed, There is an opening at the level of the grate, through which the coals are thrown on to the bars. It is claimed for this self-feeding furnace that it more nearly approaches in regularity firing by hand than any other in use, but there is no smoke when once

in operation, and a say-

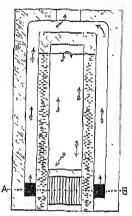


Fig. 2.-Plan of Furnaco.

period, and requires no

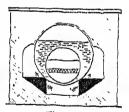


Fig. 3.

in operation, and a saving of 10 per cent. in Section through AB, fig. 2. fuel. Figs. 2 and 3 show the best arrangement of flucs. The flame on leaving the grate passes through the central tube, descends and returns along the bottom to the front, where it splits and passes on both sides to the chimney. For Blast-furnaces, Siemens's Furnaces, &c., see GLASS, IRON, COPPER, LEAD; see also BOILER, STEAM-ENGINE.

Figureaux Islands, a group of barren islands in Bass Strait, between Australia and Tasmania, Flinders Island being the largest. About 300 people, of mixed breed, earn a living on the islands by the capture of seals and sea-birds. The group takes its name from Furneaux, who discovered it in 1779. in 1773.

A good furnace ought to be able to burn a large quantity of coal on a small area of fire-grate. The amount of fuel consumed in different kinds of and linen manufactures. Pop. 5322.

Furness, a district in the north-west of Lancashire, forming a peninsula between Morecambe Bay and the Irish Sca. The chief town is Barrow-in-Furness (q.v.). The ruin of Furness Abbey, 2 miles from Barrow, is one of the finest examples of the transition Norman and Early English architecture in the country. Founded in 1127 for the Benedictines, it afterwards hecame a Cistercian house. It was long one of the wealthiest abbeys in the kingdom. The civil jurisdiction of the princely abbots of Furness extended beyond the limits of the district of Furness. See J. Richardson's Furness, Past and Present (Barrow, 1880).

Furnivall, Frederick James, a laborious and enthusiastic student of early English, was born at Eghan in Surrey, February 4, 1823, and educated at private schools, University College, London, and Trinity Hall, Cambridge, where he graduated B.A. in 1846, M.A. in 1849. He was called to the Parin 1840. Bar in 1849. In early life he associated himself in philauthropic work with Frederick Maurice, &c., taught in the Working Men's College every term for ten years, and was for the same period a captain in its rifle corps. He has devoted himself captain in its rile corps. He has devoted himself to English philology, and with characteristic energy has succeeded in founding, for the publication of texts, 'The Early English Text Society,' 1864 (with the 'Extra Series,' 1867); 'The Chaucer Society' (1868); 'The Ballad Society' (1868); the 'New Shakspere Society' (1874); 'The Browning Society' (1881, with Miss Hickey); 'The Wyclif Society' (1882); and 'The Shelley Society' (1886). He has been honorary secretary of the Philological Society since 1854, while he edited for some years the Society's great English Dictionary, the first part of which saw the light under the supervision of Dr Murray in 1884. Through these societies he has raised and expended apwards vision of Dr Murray in 1884. Through these societies he has raised and expended apwards of £30,000 in printing early MSS, and rare hooks, and has thus placed in the hands of thousands and has thus placed in the latitus of thousants of students cheap and accurate texts, some score of these well edited by himself. His Robert of Brunne's Handlyng Synne and Chronicle were edited for the Roxburghe Club and Rolls Series. His most valuable work, however, has been his splendid edition of Chancer's Canterbury Tales: 'A Six-text Print of Chancer's Canterbury Tales' (7 parts. 1868-75), being an exact wrint (with (7 parts, 1868-75), being an exact print (with the Tales in their proper order and groups) of six of the seven most important MSS.; the seventh he has since printed by itself, besides all the MSS. of Chancer's Minor Poems. This work has given a new impulse to early English scholarship, and will always remain a monument of the noble and patient enthusiasm of its editor. For the Mew Shakspere Society he has edited several books of worth in its 'Shakspere's England Series,' specially Harrison's Description of England (1577–87) and Stubbes's Anatomy of Abuses in England (1583). Of his introduction to the Leopold Shakspare, describing the plays and poems in chronological order, over 100,000 copies have been sold. He and a friend built the first narrow wagerboat in England in 1845, and he first introduced sculling fours and eights in 1884 and 1885, and was in the winning crews of the first races ever sculled in these boats. Furnivall was granted in 1884 a Civil List pension of £150. On his sixtieth birthday the university of Berlin conferred on him its Ph. D. degree, honoris causa. In 1881 he prepared a careful bibliography of Browning. In 1888 he edited, with his medical son Percy (a champion cyclist), the first English book on anatomy, which was written by Thomas Vicary in 1548. The series of forty-three fac-similes of the quartos of Shakspere's Plays, edited by Dr Furnivall and scholars under his superintendence, is now drawing to a close.

Furnival's Inn. Sec Inns of Court. Furrickabad. See FARUKHABAD.

Under the name of furs may be included the skins of almost all those animals which, for the sake of protection against cold, have for a covering an under layer of a soft, woolly or downy texture, through which grows in most instances an upper one of a more bristly or hairy nature; some by nature possess more of the under coat, and others more of the upper, the proportion varying considerably in different animals and countries. In winter the fur becomes thicker in its growth, thereby improving the quality and value for commercial purposes; young animals too possess thicker coats than full-grown ones. In some instances the underfur alone is used in manufacturing, whilst the upper hairs are removed—e.g. in the fur-seal.

The more general use of furs in all civilised

countries has made the fur-trade of the present day of even greater importance than in those flourishing days when the fur-traders were the chief pioneers of the North American continent: the quantities of many fur-bearing animals have vastly increased, especially of those rather small mammals which seem to thrive and breed quickly in the proximity of settlements; the larger ones, on the other hand, such as bears, beavers, &c., will in course of time, if not protected, become generally reduced in numbers, a fate which seems to have overtaken the

buffalo or North American bison.

The chief supply of furs is obtained from Siberia and the northern parts of North America, and, as these tracts are for the greater part of the year frostbound, the fur-bearing animals enjoy a comparatively unmolested life; the fur, therefore, grows thickly during the winter season, and is in its best condition when the animal is trapped in the arrival large quantities also of the animal. the spring; large quantities also of the smaller sorts are found in the United States; Europe produces immense numbers of common furs, such as rabbits, hares, foxes, &c., besides the more valuable stone and baum (tree) martens, though the larger animals have almost disappeared as the countries have become more and more cleared and inhabited; South America yields nutrias and chinchillas; whilst Australia exports rabbits, opossums, and kangaroos, and Africa monkey and leopard skins. Nearly all fur-skins are brought to the market in the raw or undressed state.

The two leading companies are the Hudson Bay Company (q.v.), established in 1680, and the Alaska Commercial Company, in 1870; the American Fur Company of New York, the North-west Company, and the Russo-American Company of cow once held important positions, but they have long since been broken up or amalgamated. The Skinners' Company of London, one of the city companies or guilds, formerly possessed many ancient privileges and rights in connection with the fur-trade, but these are now in abeyance. The collec-tions of firs of the two first-named companies, together with large quantities consigned from numerous private traders, are animally offered in London for public auction in January and March, with a smaller sale in June; periodical sales during the year are held besides of Australian, African, and other fur-skins. Many important fairs take place on the Continent and in Asia, of which the chief are at Leipzig in Germany (at Easter and Michaelmas), Nijni Novgorod and Irbit in Russia, and smaller ones at Frankfort (Germany), Ishim and Kiakhta (both in Siheria).

Following is a list of the principal fur-producing animals, with a few of the most interesting and important facts in connection with them regard to the fur-trade; the values are those for the raw skins in the year 1889:

FURS42

Bulger (Tacidea americana).—The fine-haired kind, used for fur purposes, comes from North America-value, 6d. to 22s.; whilst the coarse bristlyhaired skins (M.irs taxus), utilised for brushes, are imported from Russia, Bosnia, and Bulgaria;

value, 2s, to 2s, 6d.

Black Beat (Ursus americanus) yields the wellknown fur which is seen on the headgear of the Guards; also much esteemed as a general fur, as tis long, black, glossy, and thick. About 14,000 skins are imported annually from Canada, Alaska, and part of the United States, values ranging from 2s. for very common to as much as £14 for best. The Brown or Isabella Bear is a variety of the the Brown of Isabella Bear is a variety of the above, the value considerably higher, and quantity imported much less. The Russian Bear (Ursus arctes), the Grizzly Bear (U. horribilis) from North America, and the white Polar Bear (U. maritimus) from the Arctic regions likewise presess kins of considerable value.

Beaver (Castor canadensis) has a rich brown for, but is more generally known in its 'plucked' or 'unhaired' state (with the long hairs removed); the most valuable are quite black in colour; the fur has beside a good appearance when dyed. In former times beaver fur was used in the manufacture of hats, but is now almost super-eded by silk. Exported from North America in quantities Value, from 6s. of about 150,000 skins annually.

to 60s., according to quality.

Chinchilla (Chinchilla lanigera),—'Real' chinchilla is the finest and most delicate of all furs, extremely soft to the touch, and the colour bluishgray; the best come from Peru, a good skin being worth 20s. 'Bastard' chinchillas are less valuable,

and only worth from 6d. to 2s. apiece.

Ermine (Mustela comineus).—Colour of fur white (in its winter coat), with the exception of the tip of the tail, which is black. The animal is widely distributed; the chief supplies from Siberia. The unstributed; the ener supplies from Sibelia. The fur is no longer restricted to royalty as in olden times. Value, about 1s. Miniver is emine fur with black spots of lamb-skin sewn in.

Fisher or Pekan (Martes pennauti).—A North American fur; value, 13s. to 70s. Used almost exclusively by the Russians.

Firsh or Pulseat (Martes pennauti).

excinsively by the Russians.

Fitch or Polecat (Mustela putorius), from Germany, Holland, and Donmark. Used in England for rivie robes. Value, 2s. to 5s.

Blue Fox (Vulpes lagopus).—Colour, a more or less hownish blue, or deep slate at its best. About 3000 skins are imported annually from North America. Value, 45s. to 200s.

Cross Fox (Conis fulrus).—Similar to the silver

Cross Fox (Canis fulvus).—Similar to the silver ex, but redder in hue, and there is generally a darker shade of colour across the shoulders, forming a ort of cross, whence the name is derived. This fur too is mostly worn in Russia. Yearly collection about 7000; prices, from 9s. to 111s.
Gray Fox (C. virginianus), Kitt Fox (C. velox).

Both of a grayish colour, and from North America, the former from the United States; value, 11d. to 4s. 9d., and importation 30,000.

Value of the kitt fox about 2s.

Red Fox (C. fulvus).—General hue, of a sandy red, although a few from Minne ota are quite light in colour, almost white, others again from Kam-chatka are of a brilliant red. Chiefly worn as a fur in Turkey and asstars countries of English

colour is silvery black, occasionally brownish, the tip of the tail always white; a perfectly black skin (sometimes termed Black Fox) will fetch up to £55, a silvery one from £11 to £20. The majority are bought by Russia, the annual importation into

London being only about 2000 skins.

White Fox (Vulpes lagonus) is in natural history the same animal as the Blue Fox, and likewise an expensive fur; a pure white is its finest colour; the discoloured are used for dyeing black, brown, silvery black, and slate blue, the last two in imitation of silver and blue-fox fur. Value, undyed, 4s. to 34s. Quantity annually imported, 6000 to 17,000.

Hare (Lepus europeus).—The ordinary gray are from all parts of Eniope and largely used for folting purposes; in high latitudes the fur becomes a pure white in winter-time, and a large quantity of this sort is exported from Russia, some of which are dyed to imitate other more valuable furs.

Koala or Australian Bear (Phascolarctus cinereus), a common woolly fur, used for rugs, &c. Kolinsky (Mustela sibiricus), a species of marten

from Siberia, the tails of which are very valuable for artists' brushes (known as red sable). The colour of the fur is light yellow.

Lambs (Ovis aries).—Persian lamb, naturally black, but dyed the same colour to hide the white leather underneath, is wern by ladies and on gentlemen's coat collars, and often wrongly termed at trackless which is a greatly inforier termed. gentemens cout collars, and often wrongly termen Astrakhan, which is a greatly inferior sort of lamb, chiefly worn in Canada, worth only from 1s. to 2s. 6d., whereas a Persian lamb fetches from 7s. to 2s. when dyed. The collection of the latter is about 200,000, and is imported from Porsia; the Astrakhan is from Astrakhan in Russia; a similar skin to the Persian lamb, though commoner, is called Shinaz, from Shinaz in South Persia; Bokharens come from Bokhare, Ukrainer lambs from harens come from Bokhara, Ukrainer lambs from the Ukraine district, and gray Crimmers from the Crimea. Large numbers of white lambs from western Europe and Buenos Ayres are used for glove and boot linings; the white Iceland lamb as a children's fur.

Leopards (Felis pardus) are imported from Africa and India for rugs, &c. (value, 10s. to 35s.); tiges too from India (a good skin worth about £4); more valuable and thicker furred varieties of both animals are found in China, values about £7

to £12 and £10 to £60 respectively.

Lyny (F. canadensis).—The fur is of a light-brown colour, with a light silvery top on the back, that on the under part, long, soft, and spotted; about 30,000 to 80,000 are imported yearly from the Dominion of Canada, California, and Alaska. Both the annual importation and market price fluctuate considerably. Value, from 10s. to 34s.

Marten (Martes americanus).—A good and old-fashioned fur, now slowly recovering its value. The general colour is a nich brown, some skins nearly black, others again quite pale; the fur is light and soft, and generally considered one of the best for wear, appearance, price, and durability; the tails are bushy and much used for muffs, &c., a few utilised for fine artists' brushes. About 100,000 are trapped in North America, the finest in Labrador, East Maine, &c. Prices vary from 6s, to 70s. for very choice; an average price is about

FURS 43

Black Monkey (Colobus vellcrosus) possesses a long, black, silky fur, its present value being from 3. to 10s., a fairly high price compared with its usual worth. About 50,000 to 100,000 are imported every year from the west coast of Africa. The Gray Monkey (Cercopithecus diana) and a few others come as well from Africa.

Musk-rat or Musquash (Fiber zibethicus), a North American fur, about three millions of which are imported yearly, and used in nearly all countries, either 'natural' or 'plucked' and dyed, when it makes a common imitation of seal. The fur was formerly used for felting purposes. A black variety found in Delaware is also used as a fur, but in smaller quantities. Value of former, 6d. A black to Is. 9d.

Nutria or Coypu Rat (Myopotamus coypus), from South America; the far when 'unhaired' forms a cheap substitute for beaver. Value, 8d. to 1s. 9d.

Australian Opossum (Phalangista vulpma), a fur much in vogue on account of its cheapness and bluish-gray natural tint; many are manufactured when dyed various shades. Some 2,000,000 are imported every year. Price from 6d. to 2s. 3d.

American Opossum (Didelphys virginiana), an entirely different fur from the foregoing, with longer upper hairs of a silver-gray colour. Impor-

longer upper hais of a silver-gray colour. Importation, 200,000 to 300,000; value, 1d. to 2s. 5d.

Sea Otter (Enhydra Lutris), so abundant some years ago, has now saally diminished in numbers owing to indiscriminate slanghter in former years, ouly about 4000 to 5000 being now taken annually only about 4000 to 5000 being now taken annually at or near the Alentian I-lands. Its skin brings the highest individual price of all furs, and even as much as £155 has been paid for a single skin; ordinary values are from £20 to £70. The fur is dense, rich, rather long, and fine, of a dark-brown colour, the most highly valued skins possessing silvery hairs. Chiefly worn in Russia.
Otter (Lutra canadensis) is characterised by the

stoutness and density of its far, which is somewhat short like seal; used in most countries either in the natural state or 'unhaired,' and sometimes dyed. The general colour is from light to dark brown or almost black; the finest skins come from Nova Scotia and Labrador; about 16,000 are imported annually from North America, though otters are found nearly all over the world. Prices range from 9s. to 95s. for best.

Rabbit (Lepus cuniculus), from its vast quantities (probably about ten to twenty million skins ties (probably about ten to twenty million skins are used annually), is the most widely known fur in all countries, in all shapes and forms, both 'natural' and dyed; when clipped and dyed it forms an inferior imitation of fur-seal. The greater portion of the Australian importation (about 6000 bales, containing each about 200 dozen) is used for felting in the manufacture of hats, &c.; the fur when cut off for this purpose is termed 'coney-wool.'

Raccoon (Procyon lotor) yields a serviceable fur; price from 1s. 6d. to 7s. per skin, the best dark coloured, from 10s. to 20s. The colour is gray or dark gray, often with a brownish-yellow tinge; the fur is widely used in both 'natural' and dyed states. About 400,000 to 500,000 skins are yearly

About 400,000 to 500,000 skins are yearly

imported from the United States.

Russian Sable (Mustclu zihellina). the most

supply of the Alaska seal is from the Prybilov Islands in the Behring Sea, where by act of congress the quantity of skins annually taken is restricted to 100,000. Copper Island, Japan, and the adjacent seas produce large quantities of fursely and the adjacent season produce large quantities of fursely. seals; a good number are also taken at Cape Horn and Lobos Island, but the former great fisheries of the South Shetland, &c. seals, in the South Seas, from which the earlier supplies of skins were drawn, are now exhausted; a few of these last rich skins fetched over £10 apiece lately at public auction in London, where the collections of salted fur-seals are brought for sale. In the salted state they are very unsightly and dirty; the first process in their preparation, which is almost entirely earried on in London, is 'blubbering' (removing superfluous fat, &c.), and the subsequent ones, washing, 'unhairing' (i.e. removing the long, eoase, or 'water' hairs), leathering, dyeing, shaving the pelt, and machining, which last takes away all trace of the 'water' hairs, leaving the soft velvety under-fur so well known and justly appreciated.

Various other seals, such as the Common Seal (Phoca vitulina), Greenland Seal (P. greenland ison (Phoca vitulina), Greenland Seal (P. greenlandica), Fetid Seal (P. fetida), and Hooded Seal (Cystophora cristata), though chiefly caught for the sake of their oil and hides, are made use of in the further wales, the names of Suotted Hair Seals. trade, under the names of Spotted Hair Seals, Bluebacks, and Whitecoats, the two last named when dyed. The Greenland, Fetid, and Hooded seals are taken in large numbers by the Dundee whalers on the ice-floes near Greenland and Newfoundland, and it has been a common delusion that these are fur-seals, which are, however, gener-

ally killed on land.

Skunk (Mephitis mephiticus) has greatly increased as an article of commerce in the trade since 1880, whereas forty years before it was hardly known to fur-traders, being considered of little or known to fur-tiaders, being considered of little or no value from the great drawback in its powerful odour, but this has now to a great extent been overcome. The colour varies from almost white to a rich black, according as the two white stripes are more or less pronounced. About 500,000 to 600,000 skins are trapped in the central parts of the United States, a small quantity in the Dominion of Canada. Value, 6d. to 11s. 6d. Squirrel (Scrurus vulgaris).—About three millions are collected yearly in Siberia and in part of Russia in Europe; the chief trade for dressing the skins and making them into the well-known cloak

skins and making them into the well and linings is at Weissenfels in Germany. The tails fetch an enormous price for making into boas; a Values vary few too are used for artists' brushes. Values vary from a few pence to about 1s., though the skins are sold in the trade by the hundred.

Wolf .- The finest and largest (Canis Lupus occidentalis) come from Labrador and the Churchill district; the colour of these is sometimes white or blue, besides the ordinary grizzled colour. Value, 7s. 6d. to 105s., and much esteemed for sleigh robes. A smaller species, the Prairie Wolf (C. States; worth only 4s. 6d. to 8s. A large number of the large, coarse Russian Wolf (C. lupus) are used as well in the fur-trade.

Wolverine (Gulo luscus). a good fur. from Canada

awdust and common butter, by which means the pelt on leather is rendered apple; the skin is

finished in dry sawdust, and beaten out.

Certain furs, such as beaver (now to a limited extent), nutria, hare, and rabbit, are used in the manufacture of hats and other felted fabrics, for which purposes the under for alone is retained; it is ent off from the pelt, separated from the upper hair, and felted together by means of various machinery (see HAT).

Fürst. See Prince.

Fürst, Julius, German Orientalist, was born of Jewish parentage, 12th May 1805, at Zerkowo, in Posen. Educated on the strictly orthodox rabbin-ical and Make Witness ical and Hebrew literature, he felt constrained, on proceeding to Beilin to study oriental languages and theology in 1825, to discard the intellectual pabulum of his fathers for the more stimulating results of modern scientific investigation. In 1833 he settled as pricat-docent at Leipzig, and in 1864 became professor of the Alamaic and Talanadic Languages, a post he held down to his death on 9th February 1873. Among his mimerous and useful writings may be mentioned Lehrgeboude der Aramaischen Idente (1835); a praiseworthy edition of Buxtof's Helsew and Chaldee Concordance (1837-40); Die Helstew and Challee Concordance (1837-49); Die Julischen Religions-philosophen des Mittelatters (1845); Geschichte der Juden in Asien (1849); Eiblichten Judaica (1849-63); Hebraisches und Chaldrisches Handworterbuch (1851-54; translated by Dr S. Davidson, 5th ed. 1885); and Geschichte der Biblischen Luteraur und des Judisch-Hellenischen Shrifthems (1867-70).

Fürstenwalde, a town of Prussia, on the Spree, 30 miles SE, of Berlin. There are important brewerics, a large malting-house, &c. Pop. (1875) 9658; (1885) 11,364.

Firth, a manufacturing town of Bavaria, is situated at the confluence of the Rednitz and the Begnitz, 5 miles NW. of Nuremberg by the earliest German railway (1835). It is famous for its mirrors, bronze colonr, tin-el, lead pencils, combs, optical instruments, metal toys, wares of beaten gold, silver, and other leaf-metal, turnery wares, furniture, stationery, and chicory. The town has also some large breweries, and an extensive foreign trade. Pop. (1875) 27,360; (1885) 35,320, of whom 4664 were Catholies and 3330 Jews. The town was burnel to the ground in 1631 and 1850. It fell was burned to the ground in 1634 and 1680. It fell to Lavaria in 1806.

Fury and Mccla Strait, in 70° N. lat., separates Melville Penin-ula from Cockburn Island, and connects Fox Channel with the Gulf of Boothia. It was discovered by Parry in 1822, and named after his ships.

Furze (Ulex). a European genus of very branched and thorny shrubs, with linear sharply-pointed leaves, solitary flowers, and two-lipped ealyx, belonging to the order Leguminosæ, suborder Papilionacese. The Common Furze (U. curoprus, also called Whin and Gorse, is common in many of the southern parts of Europe and in Britain, although not reaching any considerable clevation, and often suffering from the frost of severe winters; whereas in mild seasons its flowers hay be seen all winter, hence the old proverb, Love is out of season when the furze is out of blossom. It is hence searcely known in any of the northern parts of the Continent; and Linneus is said to have burst into exclamations of grateful rapture when he first saw Wimbledon Common covered with furze bushes glowing in the profusion of their rich golden flowers. Furze is sometimes planted for hedges, but occupies great breadth of ground without readily acquiring sufficient strength; nor is it thickened by cutting.

It affords a wholesome fodder, especially when young, or when its thoms are artificially bruised;



Fig. 1.—Common Furze (Ulex ewopaus).

it is also useful for sheep in winter, and on this account is burned down to the ground by sheep-farmers when its stems be-

come too high and woody, so that a supply of green succulent shoots may be seeured. Firze is also esteemed as a cover for rabbits, foxes, &c. A double-tlowering variety is common in gardens. A very heantiful variety called Irish Furze (U. strictus of some botanists) is remarkable for its dense, compact, and creek branches; the Ilwarf Furze (U. nanus) is perhaps also a merc variety.

The seedling whin is of interest as bearing two or more ternate leaves just after the cotyledons. These are followed by simple leaves, as in a shoot of broom, and thereafter the characteristic spiny leaves and branches soon begin to appear (see fig. 2, and compare those of seedlings in



Fig. 2. Scedling Furze: a, cotyledons; b, instrum of leaves, ternate; e, suce, suc-leaves, ceeding

Fusan, one of the three open ports of Corea, on the south-east shore of the peninsula, is practically a Japanese settlement, under a treaty of 1876. The trade is almost entirely in their bands and in 1898, and the core of the settlement. hands, and in 1888, of 2614 foreigners, they numbered 2595. The imports in 1887 (chiefly Manchester goods, salt, and Japanese wares) were valued at 659,000 dollars, the exports (rice, beans, bide. hides, &c.), excluding specie, at 394,000 dollars. There are good custom stores, and regular communication by steamers with Shanghai, Nagasaki, and Vladivostok, and by telegraph with Scoul.

Fusaro, Lake of, a small lake of Italy, 11 miles W. from Naples, called by the Romans Acherusia Palus; it is near the site of the ancient Cume, and during the Roman empire its banks were studded with villas. Numerous remains of massive buildings, houses, and tombs are still to be seen in the neighbourhood. The water of the lake is brackish. Oysters have been cultivated here since the time of the Romans.

Fuse, Fusee. See Fuze.

Fusel or Fousel Oil, known also as POTATO SPIRIT, is a frequent impurity in spirits distilled from fermented potatoes, bailey, rye, &c., to which it communicates a peculiar and offensive odonr and taste, and an unwholesome property. Being less volatile than either alcohol or water, it accumulates in the last portions of the distilled liquor. It is principally formed in the fermentation of alkaline or neutral liquids, but does not occur in acidnlous fermenting fluids which contain tartaric, racemic, or citric acid. It mainly consists of a substance to or citric acid. It mainly consists of a substance to which chemists have given the name of anylic alcohol, whose composition is represented by the formula $C_7H_{1,1}O$. It is a colourless limpid fluid, which has a persistent and oppressive odom and a burning taste. It is only sparingly soluble in water, but may be mixed with alcohol, other, and the essential oils in all proportions. Any whisky which produces a milky amerance, when mixed which produces a milky appearance, when mixed with four or five times its volume of water, may be suspected to contain it. Fusel oil is principally sold in Britain for the purpose of yielding pear exsence (amylic acctate) for the so-called jargonelledrops. See Alcohol, Whisky.

Fu'seli, HENRY, or more properly Johann Heinrich Füssli, a portrait-painter and art-critic, was born at Zurich, 7th February 1742. In the course of a visit to England he became acquainted in 1767 with Sir Joshna Reynolds, who encouraged him to devote himself to painting. Accordingly he proceeded to Italy in 1770, where he remained for eight years, studying in particular the works of Michael Angelo, and enjoying the society of Winckelmann and Mengs. After his return to England he was elected in 1790 a member of the Royal Academy, where, nine years later, he became professor of Painting. He died at Putney, near London, 16th April 1825. His paintings, some 200 in number, include 'The Nightmare' (1781), and two series to illustrate Shakespeare's (1781), and two series to illustrate Shakespeare's and Milton's works respectively. As a painter Fnseli was bold in conception, his imagination reaching up to the loftiest levels of ideal invention; his figures were full of life and energy; and his pictures were often wrought under the poetic inspiration of the mystery of the supernatural. They are, however, too frequently deficient in careful workmanship, the execution having been hurried and rash. His Lectures on Painters (1820) contain some of the best art-criticism in the English language. His literary works, with a narrative of his life, were published by Knowles (3 vols. Lond. 1831). (3 vols. Lond. 1831).

Fusible Metal, an alloy which nuclts at a temperature below that of boiling water. It con-sists of a mixture of several metals, of which bismuth is the most important. The following are examples:

Composition.

Both on account of its melting at a low temperature and of its property of expanding as it cools, fusible metal is valuable for several purposes in the arts. It is used in stereotyping, in taking casts of medals and of woodcuts, and in testing the finish of dies. It has also been employed for making anatomical casts, and a peculiar kind of it was used for making safety-plugs for steam-boilers. For the latter purpose it melts when the pressure of the steam becomes dangerously high. It was found, however, that the alloy underwent some change, by being kept long heated to near its melting-point, which rendered it unsuitable.

but at picsent all regiments of foot carry the same pattern of rifle. Fusilier is therefore simply an historical title borne by a few regiments of the British army—viz. the Northmuberland, Royal, Lancashine, Royal Scots, Royal Welsh, Royal Inniskilling, Royal Irish, Royal Munster, Royal Dublin, besides regiments in the native army of British India.

Fusion, Fusibility. See Melting-point.

Fusiyama (properly Fuji-san), a sacred volcano, the loftiest mountain of Japan, stands on the main island, about 60 miles SW. of Tokio, and riscs some 12,200 feet above sea-level, with a crater 500 feet deep. Its last cruption was in 1707. The cone is free from snow only in July—September, when thousands of white-robed Buddhist pilgrims make the ascent easily enough.

First, Johann, with Gutenberg and Schöffer formed the so-called 'Grand Typographical Triumvirate' at Mainz between 1450 and 1466. Dr Faust (q.v.) has sometimes been confounded with him. See PRINTING.

Fustel de Coulanges, NUMA DENIS, was bon at Paris 18th March 1830, and after filling chains successively at Amieus, Paris, and Strasburg, was transferred in 1875 to the Ecole Normale at Paris, and became a member of the Institute in the same year. He died September 12, 1889. His earlier writings, Miniotre sur Pile de Chio (1857) and Polybe, on la Grece conquise par les Romains (1858), had hardly prepared the reading public for (1888), had hardly prepared the leading public for the altogether exceptional importance of his brilliant book La Cité antique (1864; 10th ed. 1885), which threw a flood of fresh light on the social and religious institutions of antiquity. The work was crowned by the French Academy, as was also his profoundly learned and luminous Histoire des Institutions politiques de l'ancienne France (vol. i. 1875)

Fustian is a name given to certain kinds of heavy cotton fabrics, including moleskin, velveret, velveteen, beaverteen, corduroy, and other varieties. They are chiefly used for men's apparel, and are nearly all of the nature of velvet, but in the case of cordurery the loops forming the pile are uncut. Fustian cloth with a velvet pile is first woven on the loom, after which the surface weft threads are successively cut, brushed, or teazled, and singed on a hot iron cylinder. The cloth is then bleached and dyed. According to the particular kind of fustian, the face is cropped or shorn either before or after it is dyed. See Velvet.

Fustic. The dyestuff sometimes termed Old Fustic is the wood of Maclara tinctoria, but the tree is also called Morus tinctoria. It is a native of Brazil, Mexico, and the West Indies. Formerly this dye-wood or its extract was largely used for dyeing wool yellow, or for the yellow portion of compound colours, but, like most other vegetable dyes, its importance has declined owing to the preference now given to coal-tar colours. The name Young Fustic is occasionally given to the wood of Rhus cotinus, the twigs and leaves of which yield a yellow dye, but are much more extensively used as a tanning material. See SUMACH, DYEING.

Filsiis, or SPINDLE-SHELL, a genus of Gasteropods, usually referred to the Murex family. The buckie' (F. or Neptunca antiquus), to which, as Wordsworth tells us, the curious child applies his It was found, however, that the alloy underwent some change, by being kept long heated to near its melting-point, which rendered it unsuitable.

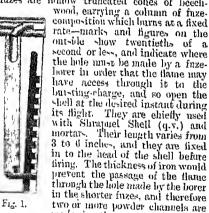
Fusiliers were formerly soldiers armed with a lighter finsil or musket than the rest of the army; fishermen. The nests or egg-cases are enrious, like those of the Whelk (q.v.). The distribution of Fusus is world-wide; the living species number about 250; the extinct forms are twice as numerous. They began in the middle Jurassic, and reached a climax in the Eocene and Misoene. Other interesting species besides the roaring buckie' are F. colus, with a siphon-canal twice as long as the shell; F. colosseus, about a fact in length; F. turtoni, from Scarborough, one of the treasures of conchologists. See WHELK.

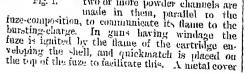
Futeligunge, and other Indian towns in Fut. See FATEIGANJ, &c.

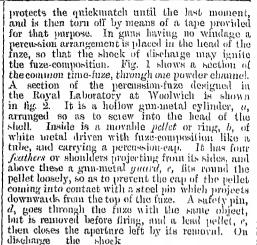
Future State. See Escharology.

Fuze, a means of igniting an explosive at the required instant, whether it is used in blasting operations, military demolitions and mines, or as the bursting charge of a shell or Bomb (q.v.). In the former cases electricity would generally be used, but for hasty military demolitions Bickford's true is employed in the British army. It is of two kinds—instantaneous and 'ordinary,' the first burning at 30 feet a second, the other at 3 feet a minute. The 'ordinary' consists of a train of gnnpowder in layers of tape covered with gutta-percha; in the 'instantaneous,' which is distinguished by crossed threads of orange worsted outside, quick-match takes the place of the gunpowder. Pawder hose is cometimes used when no other fuze is available. It is made of strips of linen, forming, when filled with powder, what is called a 'sansage,' 4 to I inch in diameter.

The fuze- used for shells are of a totally different character and of many patterns. They are of two classes, those which depend for their action upon the rate of burning of the composition in them, called 'time 'fuzes, and those which burst the shell on its striking the target, ground, or water, called 'percussion' fuzes. In the British army time-fuzes are hollow truncated cones of beech-







canses the guard to shear off the feathers, and set back with the pellet against the bottom of the fuze. The shock of impact on the target or ground eauses the pellet to set forward, bringing the cap against the pin, igniting the fuze-composition, and bursting the shell. Percussion-

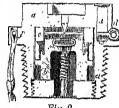


Fig. 2.

the shell. Fercussion-fuzes are chiefly used with 'common' Shell (u.v.), Very many others are in use, chiefly modifica-tions of these two types—e.g. the 'delay' action fuze has both a percussion and time arrangement, so as to burst the shell an instant after impact. All are delicate and apt to deteriorate hopelessly with age or exposure to dump. In the American pneumatic dynamite gnn, the shell contains an electric battery, and the circuit is completed by the shell striking either water or the target.

Fyne, Loch, a sea-loch of Argyllshire, running 40 miles northward and north-eastward from the Sound of Bute to beyond Inveraray. It is 1 to 5 miles broad, and 40 to 70 fathous deep. On the west side it sends off Loch Gilp (27 x 15 miles) leading to the Crinan Canal. Loch Fync is celebrated for its herrings.

Fyrd, the old English Militia.

Fyzabad (better Faizabad), a city of Oudh, on the Gogra, 78 miles E. of Lucknow by rail. Built on part of the site of Ajodhya (q.v.), it was the capital of Oudh from 1760 to 1780, but is now greatly fallen from its old-time splendour, most of its Molammedan buildings being in decay, and its palace converted into a storchouse for opium. pance converted into a storehouse for opinin. In maintains, however, an active trade, especially in wheat and rice. Pop. (1881) including cantonments, 43,927.—The area of Fyzabad district is 1689 sq. m., with 1,081,419 inhabitants; of Fyzabad division, 7305 sq. m., with a pop. of 3,230,393. For the capital of Badakhshan, see FAIZABAD.



is the seventh letter in the Roman alphabet, and in the modern alphabets derived from it. For the history of the character, and its differentiation out of C, see ALPHABET and letter C. The earliest inscription in which G is found is the epitaph on Scipio Barbatus, which

Ritschl considers was inserfied not later than 234 n.c. The substitution of G in the Roman alphabet for the disused letter Z, which occupied the seventh place in the old Italic alphabet, is believed to have been effected in the school of Spurius Carvilius, a grammarian who lived at the close of the 3d century B.C. In our minuscule g, which is derived from the Caroline script, the two loops do not belong to the majuscule form G, of which the little crook at the top of g is the sole survival. In Latin the sound of g, as in gaudeo, goans, age, was always hard, as in the English got; our soft sound, which is hoard before c and i in gist, generous, and gentle, did not come into use in Latin before the 6th century A.D. In English this soft sound is confined to words of foreign origin, such as gom and gender, and is due to Freuch influence. An initial g in words of English origin is always hard, even before c, i, and g, as in gave, et circ and ce.

get, give, and go.

The Normans could not sound our w, and substituted for it gu. Hence we have such doublets as guardian and warden, guarantee and warranty. Conversely a French g sometimes becomes w in English. Thus the old French gauffre has given us our word wafer. It is often softened to y, e, i, or a. Thus Old English genoh is now enough, gelie is alike, gut is yet, yeony is young, hand-geweore is handwork, seelig is silly. A final or medial g often becomes w or ow; thus the Old English fugol is now forel, maga is mare, sory is sorrow, lagu is law, elnboga is elbow. Sometimes g disappears altogether, as in the Old English gif, which is master and mister. Before n we occasionally have an intrusive g, as in the words foreign, feign, sovereign, and impregnable. An Old English h sometimes becomes gh, and then lapses to f, as in enough and draught. In the case of many words, such as gate, get, and again, we owe to Canton, under Mercian influences, the restoration of the Old English g, which for three hundred years had in Wessex been gradually lapsing into y.

Gabbro (Ital.), a rock consisting essentially of the two minerals plagioclase Felspar (q.v.) and Diallage (q.v.). It shows a thoroughly crystalline granitoid texture, with no trace of any hase. The plagioclase is a basic variety—labradorite being commonest, but anorthite is also sometimes present in abundance. The diallage may usually be noted by the pearly or metalloidal lustre on its cleavage-planes. It is usually either brownish or dirty green in colour. Olivine is also often met with as a constituent of gabbro, and some apatite is almost invariably present. In certain kinds of gabbro other varieties of pyroxene appear;

and amongst other minerals which occasionally occur in gabbro may be mentioned hornblende, magnesia-mica, magnetite, ilmenite, quartz. The rock is of igneous origin, and occurs in association with the crystalline schists as large amorphous masses or bosses. Sometimes also it appears in the form of thick sheets and bosses associated with volcanic eruptive rocks.

Gabelentz, Hans Conon von der, German philologist, was born at Altenburg, 13th October 1807. Even whilst still a student at Leipzig and Gättingen he spent a large part of his time in the study of Chinese and Arabic. He then began to study the Finno-Tartaric languages, and published in 1833 his Eléments de la Grammaire Mandschone. He had, moreover, a share in the establishment (1837) of Zeitschrift für die Kunde des Morgenlandes, a journal devoted to oriental science, and contributed to it some interesting papers on the Mongolian and Mordvinian languages. Along with J. Lohe he published a critical edition of the Gothic translation, and with a Gothic glossary and grammar appended (1843-46). Besides a grammar of Syrjan (a Finnish dialect, 1841), he furnished contributions to periodicals on the Swahili, Hazara, Fornosau, and Sanoyede languages. His most important work on the science of language is Die Melanesischen Syruchen (2 vols. 1860-73). Beitrage zur Sprachenkunde (1852) contains Dyak, Dakota, and Kirhri grammars, whilst Veber das Passivum (1860) is a treatise on universal grammar. In 1864 he published a Manchu translation of the Chinese works, Ssechn, Shrking, and Shiking, along with a glossary in German. Gabelentz knew upwards of eighty languages. He died 3d September 1874 at Lemmitz in Saxe-Weimar.—His son and namesake, likewise a philologist, was born in 1840, and in 1878 was called to a chair of Eastern Asiatic Languages at Leipzig.

Gabelle (derived through Low Lat. gabulum from the Old Ger. gifan or Gothic giban, 'to give'), in France a word sometimes used in a general way to designate every kind of indirect tax, but more especially the tax upon salt. This impost, first levied in 1286, in the reign of Philippe IV., was meant to be only temporary, but was declared perpetual by Charles V. It varied in the different provinces. It was unpopular from the very first, and the attempt to collect it occasioned frequent disturbances. It was finally suppressed in 1789. The word also indicated the magazine in which salt was stored. The name gabelou is still given by the common people in France to custom-house officers and tax-gatherers.

Gabelsberger, Franz Xaver, the inventor of the system of shorthand most extensively used in German-speaking countries, was born 9th February 1789 at Munich, and entered the Bavarian civil service, acting as ministerial secretary in the statistical office of the finance department from 1826 to the date of his death, 4th January 1849. The summoning of a parliament for Bavaria in 1819 led Gabelsberger to adapt the shorthand

system which he had invented for his own private use to the purpose of reporting the proceedings of the parliament. Discarding straight lines and sharp angles, he endeavoured to construct a series of signs which should conform as closely as possible to the written signs of German, and for his models went back to the majuscule forms of the so-called Thonian signs employed in Latin. His system is now used for reporting parliamentary proceedings in most of the countries in which German is the official language; and it has also been adapted to the languages of several countries outside of Germany. Gabelsberger published an account of his system in Indeitung zur Deutschen Redezeichen-Lant oder Stenographie (2d ed. 1850). See Gerber, Gabelsbergers Leben und Streben (1868).

Gaberlunzie, an old Scotch term for a beggar, from his wallet. The word is no doubt originally of the same origin as the English gabardine, 'a cloak,' from the Spanish gaban: the second part the same as loin, the part on which the wallet rests. There is extant a fine old ballad of a young lover who gained access to bis mistress through adopting the disquise of the gaberlunzie man.

Gabes. See CADES.

Gabion (Ital. gabbia, related to Lat. carea, 'hollow'), a hollow cylinder of basket-work, 3 feet high and 2 in diameter, employed in fortification for reverting purposes—i.e. to retain earth at a steep slope. A sap-roller consists of two concentric gabions, one 4 feet, the other 2 feet 8 inches in diameter, the space between being wedged full of pickets of hard wood, so as to form a movable protection for the men working at a saphead. See MINES.

Gabirol. See AVICEBRON.

Gable, the triangular part of an exterior wall of a building between the top of the side-walls and the slopes of the roof. The gable is one of the most common and characteristic features of Gothic architecture. The end walls of classic buildings had Pediments (q.v.), which followed the slope of the roofs, but these were always low in pitch. In medieval architecture gables of every angle are used with the utmost freedom, and when covered with the moulded and crocketed copes of the richer periods of the style, they give great variety and beauty of outline.

Gallets, or small gables, are used in great profusion in connection with the more decorative parts of Gothic architecture, such as canopies, pinnacles, &c., where they are introduced in endless variety along with tracery, crockets, and other

enrichments.

The towns of the middle ages had almost all the gables of the houses turned towards the streets, producing great diversity and picturesqueness of effect, as may still be seen in many towns which have been little modernised. The towns of Belgium and Germany especially still retain this medieval arrangement. In the later Gothic and the Renaissance periods the simple outline of the gable became stepped and broken in the most fantastic manner. This method of finishing gables has again become popular, all sorts of curves and twists being adopted. See CORBIE-STEPS.

Sublement a town of the postly of Belgium.

Gablonz, a town of the north of Bohemia, 6 miles SE of Reichenberg, celebrated for its glass manufactures, in which some 12,000 men are employed. The town has also textile industries, bookbinding, and porcelain-painting. Pop. 9032.

Gaboon, a French colony on the west coast of Africa between the Atlantic and the middle Congo. Its north boundary touches the German colony of the Cameroons; its south boundary is formed by the river Tshiloango and the water-parting between

the Congo and the Kwiln. Its area is estimated at 173,700 sq. m. The coast is tolerably uniform, the 173,700 sq. m. The coast is tolerably uniform, the principal indentations being Conisco Bay and the estuaries of the Gaboon and Ogowé (q.v.) in the north-west. These last are with the Kwilu (q.v.) the principal rivers of the colony. The Gaboon, 10 the principal rivers of the colony. The Gaboon, 10 miles wide at its entrance, penetrates 40 miles inland, with a width varying between 6 and 12 miles. On the north bank, which is tolerably high, is the Emopean settlement of Libreville; the south bank is low and marshy. Its chief affluents are the Como or Olombo from the east and the Remboe the Como or Olombo from the east and the Reinboe from the south. Besides these the Licona, Alima, and Lefini, about which but little is known, flow eastwards into the Congo. The climate on the coastal strip is extremely unhealthy; mean annual temperature, 83° F. On the inland platean (2000 feet above sea-level) it is better. The interior teet allove seasievel, he as bosson.

has not yet been fully explored; certain parts, as

the bein of the Oronyé, the region around the the basin of the Ogowé, the region around the sources of the Licona, the Kwiln region, and the coast-lands, are fertile and rich in natural resources. Amongst the exports figure timber, gum, ivory, gutta-percha, palm oil and kernels, earth-unts, scannum, and malachite; other products are brown secanism, and malacine; other products are brown hematite, quicksilver, sugar-cane, cotton, and hamanas. The principal imports are salt, spirits, gunpowder, guns, tolacco, cotton goods, and iron and brass wares. All agricultural operations are performed by women. The coast tribes engage in trade, which is particularly active around Loango in the south-west and on the Gaboon. The in the south-west and on the Galbon. The people belong for the most part to tribes of the Bantu stock, the more important being the Mpongwe, the Fans, Bakele, Bateke, &c. Sheep and goats are numerous, but the former yield no wool. This part of Africa was discovered by the Spaniards in the 15th century. The French made Spaniards in the 15th century. The French made their first settlement on the Gaboon estuary in 1842; twenty years later they extended their sway to the Ogowe. But they seem never to have attached any importance to the colony until after attached thy importance to the colony fifth after Savorgnan de Brazza (q.v.) began to explore it in 1876-86. By his energy and enterprise the country is being rapidly made known. Administratively the Gaboon districts belong to the colony of Seneganbia. See Brun-Renand, Les Possessions Françaises de l'Afrique Orientale (Paris, 1886).

Gaboriau, EMILE, the great master of 'police novels,' was born in 1835 at Saujon in Charente-Inférieure, and was only saved from mercantile life by a timely discovery that he could write. He had already contributed to some of the smaller Parisian papers, when he leaped into famo at a single bound with his story L'Affaire Lerouge (1866) in the feuilleton to Le Pays. It was quickly followed by Le Dossier 113 (1867), Les Esclaves de Paris (1868), Monsieur Lecoq (1869), Les Esclaves de Paris (1869), La Vie Infernale (1870), La Chique Doree (1871), La Corde au Cou (1873), L'Argent des Autres (1874), and La Dégringolade (1876). Gaboriau died suddenly, 28th September 1873.

Gabriel (Heb., 'man of God') is, in the Jewish angelology, one of the seven archangels (see ANGEL). The Mohammedans hold Gabriel in even greater reverence than the Jews; he is called the spirit of truth, and is believed to have dictated the Koran to Mohammed.

Gachard, Louis Prosper, writer on the history of Belgium, was born at Paris, 12th March 1800. He spent the greater part of his life as keeper of the archives at Brussels. He died 24th December 1885. He edited from the national archives of Belgium and Spain the correspondence of William the Silent (1847–58). Philip II. (1848–59), Margaret of Austria (1867–81), and Alba (1850); and wrote Les Troubles de Gand sous Charles V.

(1846), and Retraite et Mort de Charles V. (1854-55), hesides other books dealing with the history of Belgium.

Gad, the seventh son of Jacob by Zilpah, the handmaid of Leah, and founder of an Israelitish tribe numbering at the exodus from Egypt over 40,000 fighting-men. Nomadie by natme, and possessing large herds of cattle, they preferred to remain on the east side of Jordan, and were re-Inetantly allowed to do so by Joshua, on condition of assisting their countrymen in the conquest and subjugation of Canaan. Their territory lay to the north of that of Reuben, and comprised the montainons district known as Gilead, through which flowed the brook Jabbok, touching the Sea of Galilec at its northern extremity, and reaching as far east as Rabbath-Anmon. The men of Gad far east as Rabbath-Ammon. The men of Gad were a stalwart fighting race—cleven of its heroes joined David at his greatest need. Jephthah the Gileadite, Bazzillai, Elijah the Tishbite, and Gad 'the seer' were in all probability members of this tribe.

Gadames, or more accurately GHADAMES (the Cydamus of the Romans), is the name of an oasis and town of Africa, situated on the northern border of the Sahara, in 30° 9′ N. lat. and 9° 17′ E. long. The entire oasis is surrounded by a wall, which protects it from the sands of the desort. The streets are narrow and dark, being covered in to shield them from the sun's rays. The gardens of Gadames which grow dates for and gardens of Gadames, which grow dates, figs, and apricots, owe their fertility to a hot spring (89° F.), from which the town had its origin. The climate is dry and healthy, though very hot in summer. The town is an entroport for manufactures and foreign goods from Tripoli to the interior, and for ivory, becawax, hides, ostich-feathers, gold, &c., from the interior to Tripoli. The slave-trade is now completely abolished. Pop. hetween 7000 and 10,000, mostly of Berber descent, and in reliable to the control of the control ligion devoted Mohammedans.

Gad'ara, formerly a flourishing town of Syria, in the Decapolis, a few miles SE. of the Sea of Galilee, but now a group of rains. It was the capital of Peraa, and in all probability the chief town in the New Testament 'country of the Gadarenes' (cf. Mark, v.). It endured sieges by Alexander Jannaus and Vespasian, but fell into decay after the Mohanmedan concuest.

the Mohammedan conquest.

Gaddi, the name of three Florentine painters.
(1) GADDO GADDI, born about 1239 at Florence, where he died about 1312. None of his painting-have survived, unless four of the frescocs in the upper church at Assisi are from his hand. Of his moraies there remain specimens in S. Maria Maggiore at Rome.—(2) TADDEO GADDI, son and pupil of the preceding, was born about 1300 in Florence, and died there after 1366. A disciple of Giotto, he painted frescoes representing the life of the Virgin in the Baroncelli Chapel of the church of the Holy Cross of Elegence is tripical of the church of the Holy Cross at Florence; a triptych of the Virgin and Child, now at Berlin; another similar one at Naples; and other frescoes at Pisa and Florence. As a painter he possessed little original in-piration.—(3) Agnoto Gaddi, son and pupil of Taddeo, born about 1350, died in October 1396. At Prato he excented a series of frescoes depicting the history of the Virgin's Sacred Girdle, and in the church of the Holy Cross at Florence another series abouting the history of the Cross Resides. series showing the history of the Cross. Besides these he painted some altarpieces. Later in life he settled at Venice, and devoted himself to commercial pursuits.

Gade, NIELS WILHELM, musical composer, born at Copenhagen 22d February 1817. He became known by his Echoes of Ossian (1841), studied at Leipzig, and became Mendelssohn's successor as 212

leader of the Gewandhaus concerts there. In 1868 he was appointed master of the Chapel Royal at Copenhagen. He has composed symphonies, an oetet, the Erl King's Daughter, and other works.

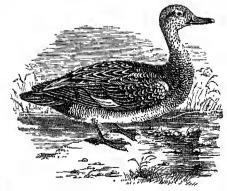
Gades. See CADIZ.

Gad-fly. See Bor. Gad'idæ (Cod-fishes), an important family of bony fishes in the sub-order Anacanthini (see BONY FISHES), including many of the most important food-fishes, such as end, haddock, whiting, and other species of Gadus, the hake (Merluceius), the fresh-water burbot (Lota), and the ling (Molva). The general characters will be readily gathered from the articles on these fishes. Most of the Gadida are littoral and surface fishes, but not a few, such as Chiasmodus (figured under FISHES), Halargyrens, the deep black Melanonus discovered by the Challenger, and Haloporphyrns, inhabit the deep sea, while a few species (e.g. burbot) live in firsh water. They vary greatly in size, from giant cod, lake, and ling four feet or so long to the dwarf-fish (Bregmaceros) of tropical seas, which measures only about three inches. See

Cod, and similar articles. Gadsden, Christopher, an American patriot, born in Charleston, South Carolina, in 1724, was born in Chanteston, South Catolina, in 1124, was educated in England, and became a succe-sful merehant in Philadelphia. He was a member of the first Continental congress (1774), rose to the rank of brigadier-general during the revolution, was lieutenant-governor of South Carolina, and cuffered nearly a year's imprisonment by the suffered nearly a year's imprisonment by the British. He died 28th August 1805.—His grandson, JAMES GADSDEN, born in Charleston, 15th May 1788, served as lieutenant-colonel of engineers in the war of 1812, and as Jackson's aide against the Seminole Indians. In 1853 he was appointed minister to Mexico, and negotiated a treaty under which the United States purchased a large section of territory, 'the Gadsden Purchase,' now forming part of Arizona (9, v.) and New Mexico. He died 25th December 1858.

Gadshill, 3 miles NW. of Rochester, commands a splendid prospect, and was the scene of Falstaff's famous encounter with the growing number of 'rogues in buckram suits.' Gadshill Place, an old-fashioned red-briek house here, which Dickens coveted as a boy, was bought by him in 1856, and was his permanent residence from 1860 till his death in 1870.

Gadwall (Anas strepera), a species of duek, not quite so large as the mallard, a rare visitant of Britain, but abundant in many parts of the continent of Europe, and equally so in Asia and in



Gadwall (Anas strepera).

North America. Being a bird of passage, it occurs also in tropical regions-e.g. the north of Africa.

It breeds in marshes, and lays from seven to nine eggs. Its voice is lond and harsh. It is much esteemed for the table, and is common in the London market, being imported chiefly from Holland.

Grea, or (i.e., in Greek Mythology, the goddess of the earth. appears in Hesiod as the first-born of Chaos, and the mother of Uranus and Pontus. She also bore the Titans, Cyclopes, Erinyes, Giants, &c. As the vapours which were supposed to produce divine inspiration rose from the earth, Grea came to be regarded as an oracular divinity; the oracles at Delphi and Olympia were believed to have once belonged to her. Her worship extended over all Greece, black female lambs being offered on her altars. She was also the goddess of marriage, and again of death and the lower world. At Rome Grea was worshipped under the name of Tellus.

Gáckwár. See Guicowar.

Gaelic Language and Literature. Gaelic is the language of the Goidel or Gael. The term includes Irish and Manx as well as Scottish Gaelic, though popular usage frequently restricts its application to the last alone. The tribes who spoke this language were known to the Romans as Scoti; and native authors, especially when they wrote in Latin, sometimes made use of the word to designate the people. Their principal home was in Ireland, and accordingly with writers like Adamnan Scotia is 'Ireland,' and lingua Scotica, 'Gaelic.' About the beginning of the 6th century a fresh colony of these Scots settled in Argyllshire, and founded the sub-kingdom of Dalriada. They were followed some sixty years later by Columba's mission to Iona. The people prospered in their new home, and by the middle of the 9th century Kenneth MacAlpin, one of their race, became king of Pictland as well as of Dalriada. In after years the names Scotiu and lingua Scotica followed these successful colonists, and Scotland became the name of the kingdom founded by them. At a later period Scot and Scottis toung were applied to the Teutonic tribes settled in Scotland and their speech, and then it became customary to speak of Gaelic as Irish, or corruptly Ersch and Ersc. But to the with them Scotland has always been Alba, Albainn, as distinguished from Eirinn, 'Ireland,' and Sasunn (Savon), 'England;' and a Scotsman, whether Celt or Teuton, is Albannach. They themselves are cople themselves such designations are unknown. or Teuton, is Albannach. They themselves are Guidheil, 'Gaels,' in contradistinction to Guill, 'strangers,' a word applied of old as a general term to the Norwegian and Danish invaders, but now to the Lowland Scot; their territory is Gaddhealtachd, 'Gaeldom,' as distinct from Galldachd or 'Lowlands;' and their speech Gaidhlig, 'Gaelic,' in contact the Carlot of trast to Beurla, formerly Belre, a word originally signifying 'language' simply, afterwards an 'un-known' or 'foreign tongue,' and now among High-landers restricted to the foreign tongue best known to them—'English.' When it becomes necessary 'Scottish Gaelic;' Guidhlig Eirionnach, 'Irish Gaelic;' and Guidhlig Mhanannach, 'Manx Gaelic.'
What the language of the tribes occupying the

What the language of the tribes occupying the north of Scotland, and collectively spoken of by the Romans as Picts, was, is not definitely ascertained. As in their blood, so in the speech of these people, there was probably a dash of pre-Celtic. That the language was largely a Celtic dialect is proved by such names as Calodonia, the root of which we have still in coill, in origin as in meaning the equivalent of holy; Clota, now Cluaidh, 'the Clyde,' a word equated by Whitley Stokes with clucre, 'to wash;' Orcades, 'isles of orc;' or, restoring initial p, 'isles of porc'—i.e. 'pigs' or 'whales'—a whale being still in Gaelic a 'sen-pig.' The idioms of Pictland

in those days seem to have been, in so far as Celtic, more closely allied to the Brythonic than to the Goidelic dialects (see Celts); but the Dalitads, powerfully backed by the Columban clergy, afterwards made Gaelie the ruling speech over the whole kingdom. It was the language of the court until Malcolm Cannore's day. The political and ecclesiastical ideas which Queen Margaret favoured were hostile to Gaelic, which from her time has been retiring steadily though slowly north and west. We get a glimpse now and again of its retreating footsteps.
Gaelic was the vernacular of Buchan in the 12th
century, probably much later. The ability to speak the language is one of the accomplishments credited to James IV. by the distinguished Spanish ambassador, Don Pedro Pneblo. It was spoken in Galloway in Queen Mary's reign, and the echoes of the old tongne lingered in the vale of Glenapp down to the close of the 17th century. It was the mother tongue of George Buchanan, Scotland's greatest scholar, who was born in Killearn in Stirlingshire. Captain Burt mentions that until shortly before the Union, when the farmers of Fife sent their sons as apprentices to the Lothians, it was made a condition of indenture that the boys should be taught English. The sweeping measures taken to punish the Clans who took part in the rebellion of 1745; the introduction of sheep-farming into the north; the spread of education; facilities of com-nunication by steam and rail; the extension of the suffrage—all have in their way been the means of introducing the use of the English tongue into even the remoter parts of the Highlands, though without largely contracting the Gaelie-speaking area. venerable language is still spoken over the whole of Arran, Argyll, Inverness, Ross, and Suthorland; in considerable portions of Perth and Caithness; and in the upland corners of Dumbarton, Stirling, Aberdeen, and Banff. According to the census of 1881 the number of persons who spoke Gaelic 'habitu-ally' in Scotland was 231,002, of whom, however, no fewer than 8517 were dwellers in Glasgow. Emigrants from the Highlands carried their mothertongue to America and Australia. In the end of last century Gaelic took root in Carolina; but the use of it in the United States and in Australia is largely on the wanc. The language is, however, preached to large and flourishing congregations throughout wide tracts of the Dominion of Canada. Through the exertions of Professor Blackie a Celtic chair was founded in 1882 in the university of Edinburgh; and by the deed of foundation the professor is bound to make 'provision for a practical class in the uses and graces of the Gaelic language, so long as that language shall be a recognised medium of religious instruction in the Highlands of Scotland. From the Dalriadic immigration until the Nor-

refan and Danish invasions, a period of 300 years, Ireland and Gaelic Scotland may be looked upon as one. The language and literature of both were the same. The Norwegian scttlement caused a temporary dislocation. The Hebrides were placed under one government with the Isle of Man, and to this day a Manxman finds Gaelic more intelligible than Irish. During this period Scottish Gaelic, separated from the parent tongue, and subjected on the one side to Norse, on the other to Pictish influence, developed certain characteristics which are still traceable. But, when things settled down, the old ecclesiastical and literary relations between the Highlands and Ireland were resumed, and maintained until the Reformation. A common literature checked the tendency of the two dialects to diverge. Accordingly, the differences between Scottish and Irish Gaelic may be regarded as mere variations of dialect, which in the spoken tongues shade into each other. In point of language Ulster is as far removed from Munster as from

Again, an Islayman feels as much at home Islay. in Antrim as in Assyut, and his patois differs less from either than that of Liddesdale differs from Buchan. The printed books show greater variations, but these are more in appearance than in reality. Manx is written phonetically, and to a Gaclic reader the page looks strange at first sight. Irish is written as a rule in the old characters, and aspiration is marked by a dot over the letter and aspiration is marked by a dot over the etter affected. Gaelic, on the other hand, has adopted the Roman alphabet, and aspiration is indicated, except in the case of infected l, n, r, by the addition of the letter h. Irish writers make a liberal use of archaic and absolete forms, while the aim of Highland authors is to bring the written language and the spoken tongue more into line. In both there has been great loss of inflexion in noun and verb; but on this down grade Scottish Gaelic has progressed even more rapidly than Irish. But in all essential features the two are one language, with a copious vocabulary, the native stores being largely supplemented from foreign sources, especially Latin and English, and with probably an infusion from a pre-Celtic non-Aryan speech. The distinctive Celtic law which places two words that are in close grammatical relation under one main accent, and treats them for the time being phonetiaccent, and treats them for the time being phonetically as one word, holds true in all the Celtic dialects, Brythonic and Goidelic alike. Under this law, initial aspiration, due to vocalic anslant, follows the same rules in Irish and Scottish Gaelic; but while the nasal anslant, technically termed eclipsis, proceeds in written Irish with all the regularity of the multiplication table, in spoken Gaelic this phonetic change appears only sporadically and native resonant resonance in the spoken of the multiplication table, in spoken Gaelic this phonetic change appears only sporadically and native resonant resonance in the spoken of the spoken ally, and native grammarians have ignored it altogetlier.

Among the more noticeable differences between Irish and Scottish Gaelic are the following. In both the accent or stress is on the root-syllable of the word, but Scottish Gaelic exhibits a tendency to follow the English fashion of throwing the accent as far back as possible. Besides, in the case of complex substantives, such as diminutives, &c., which have usually a principal and subsidiary accent, while Irishmen place the main accent on the terminal syllable, Highlanders (and here Ulster joins them) keep the principal accent on the root-syllable. Irish cubeán, 'a billock,' from enoc, 'a bill,' is in Scotland enôcen; Irish dialleog, 'a leaflet,' from dialle, 'a leaf,' Gaelic dialleog, 'a leaflet,' from dialle, 'a leaf,' Gaelic dialleog, 'a leaflet,' from dialle, 'a leaf,' Gaelic dialleog, 'vocalis,' facal. In the north Highlands the practice is carried further than in the south: poq, 'kiss,' is pig in Sutherland. Even so the open long c, sometimes also long i, is in the north Highlands diphthongised into ia, where south Argyll, like Ireland, is satisfied with the old sound: faer for four, 'grass;' nial for neul, 'cloud;' so fian for fion, 'vinum,' &c. With the exception of masculine o-stems, the nominative phral of nouns in Scottish Gaelic assumes a final n, while Irish abides by the old vocalic ending: Scottish Gaelic casan, 'feet,' Irish Gaelic cosa; Scottish Gaelic laintean, 'shirts,' Irish Gaelic leinte, &c. In the verb, Highlanders use the analytic form in some eases where Irishmen have preserved the synthetic. Because of the loss of inflexion, auxiliary verbs in Gaelic as in English have continually to be called in to form mood, tense, and voice. Except in the ease of is, ta, bheil, all different roots forming the substantive verb, there is no separate form for the present tense in Gaelic. The b-future still survives in both dialects, but the characteristic consonant f has disappeared from

Scottish Gaelic, and has hardly left its ghost behind: the Irish cuirfidh is now simply cuiridh in the Highlands.

Gaelic literature in Scotland dates from St Columba. The great missionary was an ardent student and an accomplished scribe; and succeeding abbots of Iona followed in the footsteps of the illustrious founder of the monastery. Ecclesiastics wrote in those days for the most part in Latin. It was a period of great literary activity as well as of missionary enterprise. But of the many works produced at this time few survive. With all his passion for his native saga, the Norseman, in his heathen days, made short work of the books and bells of priests. During the Danish invasions, monks fled in large numbers to the Continent, sometimes taking their MSS, along with them. Accordingly, we find that while only half-a-dozen backs, written have the lottle to the books written by Gaelic scholars before the 10th century are to be found in the British Isles, there century are to be found in the British Isles, there are over 200 MSS, of this period preserved in Austria, Italy, Switzerland, Germany, France, and Belgium. Many of these may have been written in Scotland; two certainly were. A copy of Adamnan's Life of Columba, written in Iona before 713 A.D., is now in the public library of Schaffhausen. The Book of Deer, a MS, of the 9th century, is in Cambridge. With the exception of some half-dozen MSS, in the university of Edinburgh, in the library of the Society of Antiquaries, and in private hands, all the MS, literature of the Gael preserved in this country has been, mainly through the influence and patriotism of Dr Skene, deposited for preservation and reference in the library of the Faculty of Advocates, Edinburgh. This collection consists of sixty-three separate parcels, many of them being sixty-three separate parcels, many of them being several MSS, hound together for the convenience of the owner. A large number of them were written within the last 250 years; a few are 500 years old. Many are mere tattered scraps of paper, illevible through draw draw and scraps of paper. illegible through damp, decay, and neglect; several are beautiful vellums of exquisite workmanship, as are beantiful vellums of exquisite workmanship, as fresh as in the day they were written. About half of the total number are the property of the Highland and Agricultural Society of Scotland. Thirty-two MSS., including nearly all the oldest parchments, are known to have once belonged to the M'Lachlans of Kilbride, in Nether Lorn, Argyllshire. This portion of the collection is supposed to have formed a part of the lost library of Iona. The greater number of the oldest of these MSS. are indistinguishable from the Irish MSS. of the same date. Since Norse days Scottish Gaclic has

The greater number of the oldest of these MSS are indistinguishable from the Irish MSS. of the same date. Since Norse days Scottish Gaclic has had a separate individuality, but of this the MSS. take little or no account. The centre of Gaelic learning and culture was in Ireland and Dalriada. Accordingly, we hear comparatively little of the Piet, his language, beliefs, and traditions. The men of the Isles fought and fell at Bannockburn and Flodden; but though Irish and Norse heroes are household woods with Hebridean bards, Bruce and Wallace are unknown to them. In the middle and north Highlands the political sympathy with the central government was not perhaps much stronger than in the west, but the linguistic and literary connection with Ireland was much less close. Accordingly, we find in the MS. of the Dean of Lismore, written by a native of Gleulyon in Pertlishire, between 1512 and 1540, and at a later period in the Fernaig MS., written by Duncan M'Rae in Kintail in the latter half of the 17th century, a wide departure from the traditions of Gaelic scholars. Highlandmen and their affairs obtain prominence; the language is not melely Scottish Gaelic, but frequently the provincial idiom of the scribe; the writing is in the current Scottish hand and character of the day; and the orthography

is more or less phonetic, a method adopted partly perhaps in ignorance, partly from impatience, of the strict and highly artificial rules of the schools. The MSS, in the Scottish collection frequently

The MSS, in the Scottish collection frequently supply valuable variants, sometimes welcome additions, to the large Irish collections. The subject-matter of several is religious—lives of saints, such as Columba and St Margaret; passions and homilies, such as are found in the Leubhar Brew, or 'Speckled Book.' In MS. I. (Skene's catalogue) is the Passion of our Lord as revealed to Anselm, written down in 1467 by Dugald, son of the son of Paul the Scot, a treatise not to be found in the 'Speckled Book.' A few deal with philology and kindred matters. In MS. I., for example, is preserved a copy of the Books of Primers (Urwiccht nun Eigeis), as in the Book of Ballymote. Several MSS, contain translations of portions of the henoic history of Greece and Rome: the destruction of Troy, the lahours of Hercules, the expedition of Jason; also the wars of Pompey and Casar. The genealogies, tales, mythical and legendary, of the peoples and races that inhabited freland, and of Lochlannaich or Scandinavians, are endless. The most imaginative pieces, such as the voyage of Maclduin and the adventures of Conall, are in prose, with verse inter-persed. Several historical documents and even calendars, such as that of Oengus the Culdee, are, on the other hand, thrown into the form of verse. Gaelic poetry is all lyric, the epie and the drama, as literary forms, being unknown to the people. The line as a rule is smooth and flowing, with an exceeding richness and variety of verse. In poetry as in prose the style is frequently inflated; and the language, whether of praise or blame, unmeasured, exaggerated. The literature shows that the Scottish Gael is witty rather than humorous, and that his perception of the beautiful in external nature is ever lively and true.

The most characteristic features of the Scottish collection are the almost total absence of annals, and the great richness of the medical section. Two folios relating to Irish events (1360-1402) bound up in MS, II., and the history of the Macdonalds of the Isles (MS, L.) are, apart from genealogies, pretty nearly all that deal with affairs within historic times. That records were written in Gaelie we know from various sources, though the memoranda in the Book of Deer and the Islay Charter of 1408 are almost all that survive. On the other hand, fully a third of the whole Scottish collection is medical or quasi-medical. These MSS, consist of treatises on anatomy, physiology, botany, and pharmacy. Several are translations with commentaries of portions of Aristotle's works, of Galen, Hippocrates, Bernardus Gordonns, Averroes, Isidore, &c.; but the strictly medical discussion frequently branches off now to metaphysics and theology, now to astrology and alchemy. The greater part of the M'Bheaths or Beatons or Bethunes, for many generations family physicians in Islay, Mull, and Skye. These medical books may not perhaps claim to be of great scientific value; but they are of high interest and importance as a most reliable piece of evidence regarding the state of learning and culture in the West Highlands during what we complacently call the dark ages.

The first book printed in a Celtic dialect was John Knox's Liturgy, translated into Gaelic by Bishop Carsewell of Argyll, and published in Elinburgh in 1567. Up to the middle of the 18th century not more than twenty Gaelic books were printed, and these consisted mainly of successive editions of the Psalms, Shorter Catechism, and Confession of Faith. The number of separate publications now amounts to several hundreds. A

very complete and accurate account of Gaelic books printed before 1832 is given in Reid's Bibliothicas Scoto-Celtica. Professor Blackie, in his Language and Literature of the Scottish Highlands (1876), has given admirable translations of the best efforts of modern Gaelic authors. These consist for the most part of a succession of lyric poets who have most part of a succession of tyric poets who have flourished during the last 300 years. Foremost among them are Mary MacLeod (night a Alastair Ruaidh), who was born in Harris in 1569 or thereabouts, and attained, so tradition relates, to the great age of 105 years; John Macdonald (Iain Lom) of the Keppoch family, who witnessed the battle of Inverlochy in 1645, and survived Killierankie; Alexander Macdonald (Mac Mhaighstir Mustair), the eelebrated Jacobite poet, born about 1700, received a university education, became selnolmaster in Ardnamurchan, and afterwards an officer in Prince Charles Stuart's army, published a Gaelic vocabulary in 1741, and a volume of poems in 1751; John MacCodnum, a native of North Uist; Robert Mackay (Rob Donn, 1714-78), the Uist; Robert Mackay (Rob Donn, 1714-78), the Reay Country bard; Dugald Buchaman of Rannoch (1716-68), religious poet and evangelist; Duncan Ban M'Intyre (1724-1812), the famous poet-game-keeper of Beinn dorain, fought at Falkirk in 1746, and in his old age was a member of the city grard of Edinburgh; William Ross (1762-90), schoolmaster in Gairloch; Allan MacDougall (Allean Dall, 1750-1829); Ewan M'Lachlan of Aberdeen (1775-1822), scholar and poet; and William Living-tone (1808-1870), the Islay bard. Of Gaelie poets still living may be mentioned, among others, the veteran Evan M'Coll of Kingston, Canada; John Campbell of Ledaig; Mrs Mary Mackellar; and Neil Macleod. Of late years the most notable Gaelic works published have been The Beauties of Guelic Poetry, edited by John Macmost notable Gache works published have been The Beauties of Guelic Poetry, edited by John Mackenzie; Caraid nan Gaidheal, being a selection of dialogues and articles contributed by Dr Norman Macleod the elder, the best of Gaelic prose writers, to several periodicals and books; J. F. Campbell's Tules of the West Highlands (4 vols. 1860-62), and the same author's Leabhar na Feinne or 'Ossianic Ballads' (1872); the Book of the Dean of Lismore, edited by Drs M'Lauchlan and Skene (1862); and Sheriff Nicolson's Gactic Proverbs (1881). Scholarly clergymen of a past generation—the Stewarts of Killin, Luss, and Dingwall, and Dr Smith of Completeness, rade of scalled them. Smith of Campbeltown—made an excellent translation of the Scriptures into Gaelie. The grammars of Stewart and Munro, and the dictionaries of Armstrong (1825) and the Highland Society (1828), though requiring to be rewritten in the light of modern science, are works of great merit. Among the most prominent of recent scholars in the field of Scottish Gaelic were Dr Thomas M'Lauchlan of Edinburgh, Dr Archibald Clerk of Kilmallie, and Dr Alexander Cameron of Brodick. See Celts, Picts, Ossian, Ireland, Deer.

Gaeta (Lat. Caieta), a strongly fortified maritime town of southern Italy, in the province of Caserta, is pieturesquely situated on a lofty promontory projecting into the Mediterranean, 50 miles NW. of Naples. On the summit of the promontory stands the circular Roland's tower, said to be the mausoleum of Lucius Munatius Plancus, the friend of Augustus. The beauty of the bay of Gaeta, which almost rivals that of Naples, has been celebrated by Virgil and Horace. On the dismemberment of the Roman empire, Gaota became an independent centre of civilisation and commercial prosperity. The town has been besieged on several occasions, as by Alphonso V. of Aragon in 1435, by the Austrians in 1707, by Charles of Naples in 1734, by the French in 1806, by the Austrians in 1815, and by the Italian national party in 1861. In 1848-40 it was the

refuge of Pope Pius IX.; in 1860-61 of Francis II. of Naples. The vicinity of Gaeta abounds in remains of Roman villas, &c. The citadel, which is of great strength, contains in its tower the tomb of the Constable Bourhon, killed at the taking of Rome in 1527. The inhabitants, 16,848 in 1881, are chiefly engaged in fishing and in the coasting trade in corn, oil, wine, and fruits.

Gaeta, Mola di. See Formia.

Getulia, an ancient country of Africa, situated south of Mauritania and Numidia, and embracing the western part of the Sahara. Its inhabitants belonged in all probability to the aboriginal Berber family of north and north-western Africa; they were not in general black, though a portion of them dwelling in the extreme south, towards the Niger, had approximated to this colour through intermixture with the natives and from climatic causes, and were called Melanogatuli, or 'Black Gaetulians.' The Gaetulians were savage and warlike, and paid great attention to the rearing of horses. They first eame into collision with the Romans during the Jugurthine war, when they served as light-horse in the army of the Numidian Cossus Lentulus broke them to Roman rule, obtaining for his success a triumph and the surrange of Gazulieus (6 A.D.). The ancient Gazulians are believed to be represented by the modern Tuareg.

Gaff, in a ship or boat, the spar to which the head of a fore-and-aft sail is bent, such sail having its foremost side made fast by rings to the mast, and its lower edge, in most instances, held straight by a boom. The thick end of the gaff is constructed with 'jaws' to pass half round the mast, the other half being enclosed by a rope. A gaff topsail is a small sail carried on the topmast above the gaff.—For the gaff or hook of the fisherman, see Angling.

Gage. See GAUGE; and for GREENGAGE, see PLUM.

Gage, THOMAS, an English general, was born in 1721, the second son of the first Viscount Gage. In 1755 he accompanied Braddock's ill-fated expedition as lieutenant-colonel, and as brigadiergeneral became in 1760 military governor of Montreal, and in 1763 commander in chief of the British forces in America. His inflexible character led the government to regard him as well fitted to end the disturbances in the American colonies. In 1774 he was nominated governor of Massachusetts, a post of peculiar difficulty, and his enforcement of the rigorous decrees of parliament brought matters to a climax. On the night of 18th April 1775 he climax. despatched an expedition to seize a quantity of arms which had been stored at Concord and Lexington; and on the following day the memorable encounter took place which announced to the colonies that the Revolution had begun. The battle of Bunker Hill (q.v.) was followed by Gage's recall, and he returned to England, where he died, 2d April 1787. One of his sons became third viscount

Gagern, Heinrich Wilhelm August, Frei-HERR VON, German statesman, was born at Baircuth, 20th August 1799. He was one of the founders of the student movement (Burschenschaft) of 1815-19. After holding office under the government of Hesse Darmstadt down to 1848, he became, in that year, one of the leading politicians of the Frankfort parliament, of which he was elected president. In that capacity he endeavoured to carry his views that the new central government for all Germany should be established on the basis of monarchical constitutionalism, and that the king of Prussia was the most fitting monarch to be elected to the dignity of emperor. But, dis-

couraged by the lukewarmness of Prussia, and repelled by the violence of the extreme democratic party, Gagern resigned his position, 20th May 1849, and shortly afterwards retired into private life. But from 1859 he again took part in the graud-ducal politics, as a strong partisan of Austria against Prussia. Pensioned off in 1872, he died at Darmstadt, 22d May 1880.

Gaillac, a town in the French department of Tarn, on the river Gaillac, 32 miles by rail NE. of Toulonse. The abbey church of St Michel dates from the 12th century. Its 6368 inhabitants are engaged in wine-growing, coopering, and spinning, and trade in clover, conlander seeds, plums, and

Gaillard, Château. See Andelys.

Gainsborough, a market-town of Lincolnshire, on the right bank of the Trent, 21 miles above its embouchure in the Humber, and 16 miles by rail NW. of Lineoln. The parish church, with by rail NW. of Lineoln. The parish church, with the exception of a fine old tower, dating from the 12th century, was rebuilt in 1736. The Manor House, built by John of Gaunt, now forms part of the eorn exchange. The grammar-school was founded in 1889. Vessels drawing 12 feet of water can ascend the Trent to Gainsborough, which ranks as a sub-port of Grimsby. The town manufactures linseed cake and oil, malt, and cordage. Pop. (1851) 7506; (1881) 10,873. See Stark's History of Gainsborough (2d ed. 1843).

Gainsborough, Thomas, portrait and land-scape painter, one of the greatest of English artists, was born at Sudbury, Suffolk, in 1727, the day of his laptism being the 14th of May. His father, a well-to-do clothier and crapenaker, had him educated at the grammar school of the place, where Mr Burroughs, the boy's uncle, was master; and, as he was never happy but when sketching the rustic seenery around him, he was sent to London, at the age of fourteen to study art under Gravelot, the excellent French engraver and de-signer of book-illustrations, under Frank Hay-man, and in the St Martin's Lane Academy. He returned to his native county about 1744, estabished himself as a portrait-painter at Ipswich, and in 1745 married Margaret Burr, a lady with £200 a year. He was patronised by Sir Philip Thicknesse, the governor of Landguard Fort, a view of which a traverse are accounted by Major, a law was which, afterwards engraved by Major, he was commissioned to paint. Through the advice of his friend, he removed in 1760 to Bath, where his friend, he removed in 1760 to Bath, where Thicknesse had influence, and where there was a promising opening for a skilful portrait-painter. Here he won the public by his portrait of Earl Nugent; numerous commissions followed, and in 1761 he began to exhibit with the Society of Artists of Great Britain, in Sping Gaudens, London, a body which he continued to support till 1768, when he became a foundation member of the Royal Academy, from which he afterwards practically Academy, from which he afterwards practically Academy, from which he atterwards practically retired, owing to what he considered the unworthy place that had been assigned to his group of 'The King's Daughters' in the exhibition of 1784. In 1774, after a deadly quarrel with Thicknesse, he removed to London, establishing his studio in a portion of Schomberg House, Pall Mall, and there prosecuted his art with splendid success, being in portraiture the only worthy rival of Reynolds, and in landscape of Wilson. In 1788, while attending the trial of Warren Hastings, in Westminster Hall, he caught a chill from an open window, a cancerous tuniour developed itself, and the died on the 2d of August, and was buried in Kew churchyard. Personally, Gainsborough possessed all the enthusiasm, the airy vivacity, the hot impulsiveness, that we commonly associate with the artistic temperament. He was devoted

to art in every form. Fond of company, he loved to associate with players and musicians; he was himself a performer on various instruments, and for him Ganick was 'the greatest creature living, in every respect, worth studying in every action. Quick of temper, he was also right generous both of hand and heart; and when the long-estranged Reynolds visited him on his death-bed, Gains-borough parted from him with the often-quoted words of perfect brotherhood; 'We are all going to heaven, and Van Dyck is of the company.'

The art of Gain-horough, compared with that of his great contemporary Reynolds, is less scholarly and more instinctive; his portraits show less deep insight into character than those of his rival, but they have perhaps even more of grace, give perhaps even more vivid glimpses of the shifting gesture and expression of the moment. Gainsborough never studied abroad, never left his native country; and though, at various times, he copied from Rubens, Teniers, Vandyke, and Rembrandt, he did so with no merely imitative aim. Nature her-self was always before his eye, and nature he interpreted in a manner most individual. His earlier works are firmly and directly handled, with definite combinations of positive colouring; but as his art gamed in power he sought more and more for harmony of total effect, for gradation and play of subtly interwoven lines; painting his flesh thinly, but with great certainty of touch, with exquisite refinement of modelling, and with with exquiste refinement of modelling, and with the most delicate transparency in the shadows; and relieving it by the shifting sheen of his draperies, and by backgrounds of swiftly struck, low-ely touched follage, and of softly blending tints of sky. While his landscapes were unduly preferred to his portraits by the—penhaps not un-prejudiced—judgment of Reynolds, they too possess admirable artistic qualities, in their free-dom of landling and heavyney of colour and effect dom of handling and harmony of colour and effect. Though, as Mr Ruskin has truly noted, they are 'rather motives of feeling and colour than earnest studies,' they have still value as faithful records of a distinctly personal impression of natme; and while Richard Wilson developed with delicate skill the traditions of Claude, Gainsborough may, in some sense, be regarded as the forerunner of Constable, as the founder of the freer and more individual land-cape art of our own time.

individual land-cape art of our own time.
Gainsborough is excellently represented in the National Gallery, London, by fourteen works, including portraits of 'Mis Siddons,' of 'Orpin the Parish Clerk,' and of 'Ralph Sehomberg, M.P.,' and 'The Market Cart,' and 'The Watering-place;' in the National Portrait Gallery, London, by five works; in the Dulwich Gallery by six works, including the portraits of 'Mis Sheridan' and 'Mrs Tickell;' and in the National Gallery of Scotland by the portrait of the 'Hon. Mrs Graham.' One of his most celebrated portraits is that of Master Jonathan Buttall, known as 'The Blue Boy,' in the collection of the Duke of Westminster. An exhibition of over 200 of his works was brought together in the Grosvenor Gallery, London, in 1885. See the Life by Fulcher (1856), Wedmore's Studies in English Art (1876), and Brock-Arnold's Gainsborough and Constable (1881).

Gairdner, William Tennant, a distinguished physician, was born in 1824, son of John Gairdner, M.D., F.R.C.S. Edin. (1790–1876), and nephew of William Gairdner (1793–1867), an eminent London physician, and author of a standard work on gout. He graduated M.D. at Edinburgh in 1845, becoming Fellow of the Royal College of Physicians there in 1850, and afterwards LL.D. of Edinburgh and M.D. (honoris causa) of Trinity College, Dublin. He was appointed by the erown in 1862 to the chair of Praetiee of Medicine in

Glasgow University, was President of the Medical Association there in 1888, and is physician in ordinary to the Queen for Scotland. He has contributed many valuable papers to the special medical journals, and was an esteemed contributor to the first edition of this Encyclopedia. Among his books are Pathological Anatomy of Bronchitis and Discases of the Lungs (1850), Notes on Pericarditis (1861), Clinical Medicine (1862), Public Health in relation to Air and Water (1862), On some Modern Aspects of Insanity, Lectures to Practitioners (in conjunction with Dr J. Coats, 1888), The Physician as Naturalist (1889).—James Gairden, historian, a brother of the foregoing was born at Edinburgh, March 22, 1828, attended lectures in the university there, and at eighteen as a clerk entered the Public Record office in London, where he became assistant-keeper in 1859. He has distinguished himself by the rate combination of profound erndition, patient accuracy, and judicial temper which he has shown in the editing of a long series of historical documents: Memorials of Henry the Seventh (1858); Letters and Papers illustrative of the Reigns of Richard III. and Henry VII. (2 vols. 1861-63), in the Rolls series; the continuation from vol. v. onwards of the late Professor Brewer's Calendar of Letters and Papers, Forcign and Domestic, of the Reign of Henry VIII. (9 vols. 1862-86); and Historical Collections of a London Citizen (1876), and Three Fifteenth-Century Chronicles (1880), for the Camden Society series. Equally valuable are the books addressed to a wider audience: an edition of the Paston Letters in Professor Arber's series (3 vols. 1872-75); The Houses of Luncaster and York, in 'Epochs of Modern History' (1874); the Life and Reign of Richard III. (1878) England in 'Early Chroniclers of Europe' (1879); Studies in English History (1881), a series of essays written in conjunction with Spedding; and Henry VII., in the 'Statesmen' series (1889).

Gairloch, an inlet of the sea on the west coast of Ross-shire, 6 miles in length, which gives name to a parish and village. See J. H. Dixon, The Gairloch (1888).

Gaisford. Thomas, D.D., a distinguished classical scholar, was born in 1780 at Hford, Wilts. He graduated at Christ Church, Oxford, in 1804. He published an elaborate edition of the Enchiridion of Hephestion, was public examiner 1809-10, and in 1811 was appointed regins professor of Greek at Oxford. From 1819 to 1847 he was rector of Westwell, Oxfordshire. In 1831 he became dean of Christ Church. He died in 1855, and in his memory a Greek prize was founded at Oxford. Among his classical publications are an edition of the Lexicon of Suidus (1834), and the Etymologicon Magnum (1848).

Gaius, a Roman jurist, who flourished between 130 and 180 A.D. Of his personal history next to nothing is known. Before the revision of the Roman laws, and the reform of legal studies by Justinian, the Institutes of Gaius, as well as four other of his treatises, were the received text-books of the schools of law. His Institutes, moreover, formed the groundwork of the Institutes of Justinian. The other works of Gaius, of which we have little more than the titles, were largely used in the compilation of the Digest, which contains no fewer than 535 extracts from his writings. The Institutes was, like the others, almost completely lost, until in 1816 Niebuhr discovered it at Verona, under a palimpsest of the Epistles of Jerome. This discovery threw a flood of light upon the history of the early development of Roman law, especially upon the forms of procedure in evil actions. The first book treated of status and family relations;

the second, of things and of how possession of them may be acquired, including the law relating to wills; the third, of intestate succession and obligations; and the fourth and last, of actions. Alaric II., king of the West Goths, promulgated in 506, for the use of his Roman subjects, the code known as Breviarium Alarici, which contains copious excerpts from Gains. Of numerous editions of the Institutes published since 1817, may be mentioned those in face-simile by Bocking (Leip. 1866) and Studenund (Leip. 1874), and with an English translation by E. Porte (2d ed. Oxford Clarendon Press, 1875) and James Muirhead (Edin. 1880).

Galabat, a small republic of Negroes from Dar-Far and Wadai, situated near the western frontiers of Abyssinia. The people, some 20,000 in number, and fanatical Mohammedans, trade with Abyssinia in coffee, cotton, hides, and beeswax.

Galactodendron. See Cow-tree. Galactometer. See Lactometer.

Galacz. See GALATZ.

Galago, a genus of large-cared, long-tailed, African Lemurs (q.v.), arboreal and nocturnal in habit, living on fruit and insects. They vary from the size of a rabbit to that of a rat, are covered with thick soft woolly fur, have somewhat bushy tails longer than the body, and hind-legs longer and stronger than the arms, with two of the ankle bores (ralcaneum and navicular) greatly elongated. The head is round like a eat's; the eyes are large with oval pupils contracting in daylight to vertical slits; the cars are naked and very big, expanded during activity, but rolled together when the animal rests. The digits are strong and well adapted for grasping the branches; all bear nails except the second on the hind-foot, which is clawed. The dentition



Galago Montciri.

suggests insectivorous rather than vegetarian diet. The female is said to bear one young one at a birth, and often carries it about. Soft nests are also made in the branches. The Galago proper (G. senegal-cusis or Otolicuus Galago) is a pretty animal with woolly fur, grayish fawn above, whitish beneath. It seems to be distributed throughout tropical Africa, and is known in Senegal as 'the gum animal' from its frequent habitat in mimosa or gum-acacia forests, and from its alleged habit of gum-chewing. They sleep with bowed head and tail curled round them during the day, but at night they are as active as birds, watching for moths and small animals, on which they spring with great adroitness. They are

said to form a favourite article of food in Senegal. The largest species (G. or O. crassicaudatus) measures a foot in length, not including the bushy tail, which is 15 or 16 inches more. 'In Zanzibar the Komba (G. or O. agisymbanus) is said frequently to make itself intoxicated with palm-wine, so that it falls from the tree and gets caught.' It is readily tamed and utilised to catch insects and mice in the houses. There are numerous species, sometimes distributed in sub-genera.

Galahad. See GRAIL.

Galangale (Alpiniu galanga; not to be confused with 'the slender galingale,' see Galingale), a genus of Zingiberaceie cultivated in the Eastern Alchipelago, and much used in the East for the same purposes as ginger.

Galanthus. See Snowdror.

Galapa'gos (Span. Galapagos, from galapago, 'a tortoise'), a group of islands of volcanic formation, lying on the equator, about 600 miles W. of Ecuador, to which they belong. The archipelago derives its name from the enormous land tortoises formerly found there in great numbers; but the individual islands all possess names of English origin—probably bestowed by the buceancers who made them a sort of headquarters during the 17th century. The group consists of seven principal islands, with about half-a-dozen of lesser size, and innumerable islets and rocks; the area is estimated at 2940 sq. m., of which Albemarle Island embraces over half. Rising to a height of nearly 5000 feet, and with a climate dry and somewhat tempered by the cool Peruvian current, the islands are covered with a dense vegetation on the southern side, which absorbs the moisture carried by the trade-wind; on the northern side they are barren and forbidding in aspect, the lower parts covered entirely with ashes and lava or with prickly serub. Darwin puts the number of craters in the group at 2000; some appear to be not yet extinct. The Galapagos possess both a flora and fanna peculiar to themselves; over a hundred species of plants have been noted that are uset with nowhere clse, and the species of animals differ greatly even in the various islands. The archipelago was annexed by Ecuador in 1832, and attempts were made to colonise it, of which the only remaining result is the so-called 'wild eattle.' Charles Island was used as a penal settlement for some years, but it and Chatham Island are now occupied by agricultural colonists, the chief erop being sugar. Cotton, vegetables, and most cereals are also raised, and molasses, rum, hides, and Archil (q.v.) are exported. Pop. (1885) 204. See Darwin's Voyago of the Bacgle, and a paper by Captain Markham in Proc. Roy. Geog. Soc. (1880).

Galashiels, the chief seat in Scotland of the Scotch tweed manufacture, occupies 2½ miles of the narrow valley of the Gala, immediately above the junction of that river with the Tweed. Although situated partly in Roxburghshire and partly in Selkirksbire, for judicial purposes it has been fixed by an act passed in 1867 as within the county of Selkirk. It is 33½ miles SSE. of Edinburgh, and 4 WNW. of Melrose. In the 15th century it is spoken of as 'the forest-steading of Galashiels;' and its tower, demolished about 1814, was then occupied by the Douglases. In 1599 it was made a burgh of barony, having then 400 inhabitants. As early as 1581 wool was here manufactured into cloth, and in 1790 the value of the cloth so manufactured was £1000. So great, however, has been the progress of the woollen trade of the town during the present century, that in 1890 the estimated value of tweeds manufactured was no less than one million and a quarter sterling. By the Reform Act of 1868 it was made a parliamentary burgh, and along with Hawick and Selkirk sends a member to

parliament. A local act of parliament was obtained in 1876, under which the bounds of the burgh were extended for nunicipal purposes, and a water-supply introduced. Galashiels' chief claim to notice is its manufacturing enterprise. It has 23 woollen factories containing 120 'setts' of carding engines, with 100,562 spindles. The goods manufactured are almost exclusively the well-known woollen cloth called Scotch tweed. The mills are almost entirely dependent on steam for motive power. The town has also the largest and best-appointed skinnery in Scotland. Its valuation rose from £29,838 in 1872 to £62,667 in 1889. Pop. (1831) 2209; (1861) 6433; (1871) 10,312; (1881) 15,330, of whom 12,434 were within the extended burgh. See T. Craig-Brown's History of Schlickshire (1886).

Galata, a suburb of Constantinople (q.v.). Galatea. See Acrs and Pygmalion.

Galatia, also Gallo-Grech, in ancient geography, a country of Asia Minor, separated from Bithynia and Paphlagonia on the N. by the Olympus range (Ala-Dagh) and the river Halys, and hounded on the E. by Pontus, on the S. by Cappadocia and Lycaonia, and on the W. by Phrygia. The country is an elevated platean, 2000 to 3000 feet above sea-level, consisting for the most part of a folling grassy region, that affords excellent pasturage for sheep and goats. The western half of Galatia is watered by the Sangarius, whilst the Halys traverses it in the middle and north-east. The climate is one presenting extremes of heat and cold. The boundaries of Galatia have, however, varied at different epochs of history. Originally it formed part of Phrygia. The name Galatia it received from a body of Ganks who, breaking off from the army of Brennus, when that chieftan invaded Greece, entered Asia Minor about 278 E.C. and were finally defeated in a great battle by Attalus, king of Perganus, in 235, who thereupon compelled them to settle in Galatia. Remaining independent, however, they proved formidable foes to the Romans in the wars of the latter against the kings of Syria; and although subdued by the Roman general Cheus Manlius in 189, they still continued to govern themselves, latterly under a single king. These Gauls, who became Hellomised shortly after settling in their new country, although they clung to their native language down to the 4th century, extended their power during the list century becover Pontus, part of Armenia, Lycaonia, Isauria, and other districts. But on the death of King Amyntas in 25 b.C. the country was made a Roman province, which was further divided by Theodosius the Great into Galatia Prima, with Ancyra (Angora) for its capital, and Galatia Secunda, with Pessinus as chief town.

Galatians, The Epistle to the churches of Galatia.' According to Lightfoot it was written from Macedonia or Achaia in the winter or spring of the years 57-58 A.D. Others place it at the end of 55 or the beginning of 56, on the apostle's journey to Ephesus or in the early part of his sojourn there. It is one of the most important of the four epistles which are undoubtedly from the hand of Paul, and was written to counteract the influence of the Indaisers who had appeared among the Gentile Christians of the churches of Galatia. Those churches had been founded by Paul during the second, and revisited by him during the third, of his missionary journeys (cf. Acts, xvi. 6, and xviii. 23). At his first visit the people received him as 'an angel of God,' and he was detained among them by sickness for a considerable time. It is disputed whether the passages i. 9, iv. 16-20, and v. 7, 12 show traces of the Judaising leaven even at the time of his second visit, or whether i. 6, iii. 1.

and v. 7, 8 are sufficient to prove that they did not appear till after his departure. As the Roman appear im after his department. As the trouble province of Galatia formed in 25 B.C. included also Isauria, Lycaonia, and parts of Pisidia and Phrygia, some think that the 'churches of Galatia' may have extended to those regions, but it is more probable that the Galatia of Paul was confined to the upper basins of the Halys and Sangarius. Barbarian hordes of Galati or Gallogreet had settled there in the 3d century B.C., and in the larger towns, like Tavium, Pessinus, and Ancyra, adopted Greek speech and manners, while the country people, down to the time of Jerome, spoke a language 'almost identical with that of the Treveri.' Lightfoot concludes from his elaborate investigations that the Galatian settlers belonged to the Cymric branch of the Celtic race. Though the population in-cluded also aboriginal Phrygians, as well as Greek, Roman, and Jewish immigrants, the characteristic vitality of the Celts maintained the predominance of that race, whose proverbial impressibility and fickleness are so clearly illustrated in the epistle to the Galatians. The 'troublers' maintained that every one who entered into God's Covenant must be circuncised, and keep the whole law, whose dis-cipline was a moral necessity for all men, and on whose observance the promises of the Old Testament were dependent. Galatians is the only epistle of Paul which has no word of praise for its recipients. It at once plunges passionately into the immediate practical question—why they are 'so soon removed... unto another gospel,' and from beginning to end has no tidings, messages, or greetings. The body of the epistle is commonly divided into two parts—(1) theoretical (i. 6—v. 12) and (2) practical (v. 13—vi. 10). Holsten and others prefer the following division of the argument: (1) the divine origin of Paul's general ground by a the divine origin of Paul's gospel proved by a historical demonstration of the impossibility of its opposite (i. 6—ii. 21); (2) the full right of the believing Gentile to the blessing of the Messianic promise proved by a confutation of the assertion that the Messianic approximately assertion of the the Messianic promise proved by a confutation of the assertion that the Messianic solution in the confusion of the full right of the confusion of the confusion of the impossibility of its opposite (i. 6—ii. 21); (2) the full right of the confusion of the impossibility of its opposite (i. 6—ii. 21); (2) the full right of the confusion of the impossibility of its opposite (i. 6—ii. 21); (2) the full right of the confusion of the impossibility of the confusion of th that the Messianic salvation is in any way de-pendent on circumcision and legal observances (iii. 1—iv. 11); (3) the believer's righteousness of life proved to be the fruit or outward expression of the Spirit bestowed upon him—in contradiction of the supposed necessity of a righteousness of life which should be brought about by subjection to circumcision and law (iv. 12—vi. 10).

cision and law (iv. 12—vi. 10).

The chief commentaries on Galatians are those of Luther (1519; Eng. trans. Lond. 1810); Winer (1821; 4th ed. 1859), Ruckert (1833), Schott (1834), De Wette (1841; 3d ed. by W. Möller, 1864); Windischman (Catholic, 1843), Hilgenfeld (1852), Ellicott (1854; 4th ed. 1867), Jowett (1856), Wieseler (1859), Hofmann (1863; 2d ed. 1872), Lightfoot (1865; 5th ed. 1880), Eadie (1869), Brandes (1869), O. Schmoller (1875), Meyer (6th ed. by F. Sieffert. 1880), Holsten in the Protestantenbibil (3d ed. 1879; Eng. trans. by F. H. Jones, 1883) and in Das Evanyelium des Paulus (vol. i. 1880), Schaff (1881), Wörner (1882), Philippi (1884), Köhler (1884), Beet (1885), and Findlay (1888).

Galatina, a town of Italy, 13 miles SW. of Lecce. It has a church, erected in 1384, with antique sculptures and fine tombs of the Balzo-Orsini family. Pop. 8720.

Galatz, or GALACZ, a river-port of Moldavia, the centre of the commerce of the Roumanian kingdom, is situated on the left bank of the Danube, 3 miles below the influx of the Screth, and 85 from the Sulina month of the Danube, whilst by rail it is 166 NE. of Bucharest, and 259 SW. of Odessa. It occupies the slope of a hill overlooking the river, and is divided into an Old and New Town, the former consisting of irregularly built streets, the latter built more after the fashion of western Europe. Its dockyard, its large bazaar,

its grain-stores, its magazines of oriental wares, and its banking establishments deserve notice. The chief objects of industry are iron, copper, wax candles, and soap. The exports consist of maize, wheat, wheat-flour, barley, rye, and timber. The imports include timber, grain, fish, fruits, oil, chemicals, iron, steel, and cotton goods. The town has been, since 1856, the seat of the International Danube Commission. The population, a medley of various nationalities, has risen from 36,000 in 1869 to 80,000 in 1887. Galatz has frequently been taken in the wars between the Russians and Turks since 1789. It ceased to be a free port in 1883.

Gala Water, a stream of Edinburgh, Selkirk, and Roxburgh shires, rising among the Moorfoot Hills, and winding 21 miles south-outh-eastward, part Stow and Galashiels, till, after a total descent of 800 feet, it falls into the Tweed, a little below Abbot-ford, and 2½ miles W. of Melrose. In its valley, the ancient Wedale, Skene localises one of Arthur's battles; its 'braw, braw lads' are famous in som

Galaxy (Gr. gala, 'milk'), or the Milky-way, is the great luminous band which nightly stretches across the heavens from horizon to horizon, and which is found to form a zone very irregular in outline, but completely encircling the whole sphere almost in a great circle, inclined at an angle of 63 to the equinoctial. At one part of its course it opens up into two branches, one faint and interrupted, the other bright and continuous, which do not reunite till after remaining distinct for about 150. Its luminosity is due to immunerable multitudes of stars, so distant as to be blended in appearance, and only distinguishable by powerful telescopes. How a collection of stars can assume such appearances as are presented in the Galaxy is explained in the article Stars (q.v.). The investigation of this subject was largely the work of Sir William Herschel. The origin of the current figurative use of galaxy, as in 'galaxy of beauty,' 'galaxy of wit,' is sufficiently obvious.

Galba, Servius Sulficity, Roman emperor falba, Servius Sulficity, Roman emperor form June 68 A.D. to January 69, was born 24th December 3 B.C. He was raised to the consulship in 33 A.D., and conducted the administration in Aquitania, Germany, Africa, and Hispania Tarraconensis with courage, skill, and strict justice. In 68 the Gallic legions rose against Nero, and proclaimed Galba emperor. But Galba, now an old man, soon made himself unpopular by placing himself in the hands of greedy favourites, by ill-timed severity, and, above all, by his avarice. Shortly afterwards he was assassinated by the prætorians in Rome.

Galbanum, a gum-resin, used in medicine in the same cases as asafectida. It is met with in hardened drops or tears, usually compacted into a mass, of a brown to light-green translucent colour, and possessing an aromatic odour and bitter alliaceous taste. Galbanum contains about 7 per cent. of volatile oil, besides resin and gum. It is applied as a plaster to indolent swellings, and occasionally administered as a stimulating expectorant, and in amenorrhea and chronic rheumatism. Although known from earliest times, and used as an incense by the Israelites (Ex. xxx. 34), under the name of chelbenah, its source has always been uncertain. There seems to be little doubt, however, that it is obtained from the Ferula Galbanifua and F. rubricaulis, umbelliferous plants found in Persia.

Galchas, a collective name given by Ujfalvy to a group of tribes inhabiting the highlands and upland valleys of Ferghana, the Zarafshan, and the Oxus. They are closely akin to the peoples of the Iranic stock, and in speech are near the Tajiks and Persians. They are Sunni Mohammedans.

Gale, or SWEET GALE (Myrica gale), a kinred species to

dred species to the North American Candleberry (q.v.), and widely distributed through the peaty mplands of the palæarctic world. Îts leaves and berries are dotted with resinous oildrops, which have a most agreeable fragrance, and formerly also gave ita most extensive and varied range of uses in the domestic economy of the Scottish



Gale (Myrica gale).

Highlands and other northern countries, for beds, candles, hops, &c.

Galen, or CLAUDIUS GALENUS, a celebrated Greek physician, was born at Pergamus, in Mysia, 130 A.D. In his nineteenth year he began the study of medicine, first at Pergamus, afterwards at Smyrna, Corinth, and Alexandnia. On his return to his native city in 158 he was at once appointed physician to the school of gladiators. But six years later he went to Rome, where he stayed for about four years, and gained such a reputation that he was offered, though he declined, the post of physician to the emperor. Scarcely, however, had he returned to his native city when he received a summons from the Emperors M. Aurelius and L. Verus to attend them in the Venetian territory, and shortly afterwards he accompanied or followed them to Rome (170). There he remained several years, though how long is not known precisely: at all events he attended M. Aurelius and his two sons, Commodus and Sextus, and about the end of the 2d century was employed by the Emperor Severus. If the statements of one of his Arabic biographers, Abu-'l Faraj, be correct, he must have died in Sictly about the year 201, though the exact place and date of his death are not known with certainty.

Galen was a voluminous writer not only on medical, but also on philosophical subjects, such as logic, ethics, and grammar. The works that are still extant under his name consist of 83 treatises that are acknowledged to be gennine; 19 whose genuineness has been questioned; 45 undoubtedly spurious; 19 fragments; and 15 commentaries on different works of Hippocrates. His most important anatomical and physiological works are De Anatomicis Administrationibus, and De Usu Partium Corporis Humani. As an anatomist, he combined with patient skill and sober observation as a practical dissector—of lower animals, not of the human body—accuracy of description and clearness of exposition as a writer. He gathered up all the medical knowledge of his time and fixed it on such a firm foundation of truth that it continued to be, as he left it, the authoritative account of the science for centuries. His physiology does not, according to modern ideas, attain to the same level of scientific excellence as his anatomy. He is still dominated by theoretical notions, especially by the Hippocratic four elements (hot, cold, wet, and dry) and the Hippocratic humours. His therapeutics are also influenced by the same notions, drugs having the same four elemental qualities as the luman body; and he was a believer in the principle of curing diseases traceable, according to him, to the maladmixture of the elements, by the use of drugs possessing the oppo-

site elementary qualities. His pathology also was very speculative and imperfect. In his diagnosis and prognosis he laid great stress on the pulse, on which subject he may be considered as the first and greatest authority, for all subsequent writers adopted his system without alteration. He likewise placed great confidence in the doctrine of critical days, which he believed to be influenced by the moon. In materia medica his authority was not so high as that of Dioscorides. Numerous ingredients, many of which were probably inert, enter into most of his prescription. He seems to place a more implicit faith in anulets than in medicine, and he is supposed by Cullen to be the originator of the anodyne necklace which was so long famous in England. The sub-equent Greek and Roman medical writers were mere compilers from his writings; and as soon as his works were translated (in the 9th century) into Arabic they were at once adopted throughout the East to the exclusion of all others.

GALLNICAL, GALENIST, are words having reference to the controversies of the period of the re-vival of letters, when the authority of Galen was strongly asserted against all innovations, and par-ticularly against the introduction of ehemical, or nather alchemical ideas and methods of treatment into medicine. The Galenists adhered to the ancient formulas, in which drugs were prescribed, either in sub-tance or in the form of tinctures and extracts, &c.; while the chemists professed to extract from them the essences or quintessences (quinta essentia, the fifth essence, supposed to be particularly pure, as requiring five processes to extract it)—i.e. substances in small bulk, presumed to contain the whole virtues of the original drugs in a state of extreme concentration, or purified from all gross and pernicious or superfluous matter.

There have been numerous editions of Galen's writings, a nere nave been numerous editions of Galon's writings, or parts of them; the most accessible, as well as probably the best, is that of C. G. Kuim (20 vols, 1821-33). For a general account of his anatomical and physiological knowledge, see Kidd in vol. vi. of Trans. Procucial Med. and Surg. Assoc. (1837); Daremberg, Des Councissances de Galien (Paris, 1841); and the epitome in English by J. R. Coxe (Phila. 1846).

Galena, or LEAD-GLANCE, a mineral which is essentially a sulphide of lead, the proportions being 13.4 sulphur and 86.6 lead; but usually containing a little silver, and sometimes copper, iron, zinc, antinony, or selenium. It has a hardness equal to 21-3, and a specific gravity of 7.2-7.6. It is of a lead-gray colour, with a metallic lustre, is found massive, or sometimes granular, or crystallised in cubes or cotabellous. It is very excits broken cubes or octahedrons. It is very easily broken, and its fragments are cubical. It occurs in veins, bed-, and imbedded masses, often accompanying other metallic ores, such as zinc-blende, in the older stratified rocks, but most of all in what is known as the carboniferous or mountain-limestone. It is found very abundantly in some parts of Britain, and in many other countries, as in Sweden, Germany, Switzerland, Hungary, France, the United States, &c. Almost all the lead of commerce is obtained from it. It sometimes contains a supply of the control of tains so much silver that the separation of that metal is profitably carried on. The Lead (q.v.) is extracted from it by a very simple process.

Galena, a city of Illinois, on the Fevre River, 6 miles above its junction with the Mississippi, and 133 miles WNW of Chicago by rail. The river runs here between high limestone bluffs, and the town is built on a series of terraces. It contains a custom house, and a number of mills, foundries, and furniture factories, and exports a large quantity of lead (mined and smelted in the vicinity) and zinc. Pop. (1870) 7019; (1880) 6451.

Galeri'tes (galerus, 'a cap'), a genus of fossil sea urchins, peculiar to and abundant in the Creta-

ceous System. The generic name, as well as that popularly given to them in the districts where they abound-viz. 'Sugar-loaves,' is descriptive is descriptive of the elongated and more or less conical shape of their shell. The body in breadth is nearly circular or polygonal. The under surface is entirely flat, and has the month placed Galerites albogalerus.



in its centre, with the vent near the margin. There are five avenues of pores near the margin. There are five avenues of pores. reaching from the mouth to the summit. fossils are often found silicified. The species figured is one of the most abundant; it has received its specific name from its resemblance to the white

caps worn by the priests of Jupiter.

Galerius. Galcrins Valerius Maximianus, a Roman emperor, was born of humble parentage, near Sardiea, in Dacia. Entering the imperial army, he rose rapidly to the highest ranks. In 292 Dioeletian conferred on him the title of Cossar, and gave him his daughter in marriage. Tu 296-7 he conducted a campaign against the Persians, in he conducted a campaign against the Persians, in which, though not at first successful, he decisively defeated their king, Naises. On the abdication of Diocletian (305) he and Constantius Chlorus became joint-rulers of the Roman empire, Galerius taking the eastern half. When Constantius died at York (306) the troops in Britain and Gaul implication to the characteristic transferred this successful transferred the characteristic transferred the characteristic transferred the characteristic transferred the characteristic transferred to the characteristic transferred to the characteristic transferred to the characteristic transferred to the characteristic transferred the characteristic transferred to the characteristic transferred t mediately transferred their allegiance to his son, Constantine (afterwards Constantine the Great).
Galerius, however, retained possession of the east till his death in 311. Galerius was a brave soldier and a skilful commander; but he is believed to have forced Diocletian to issue his famous edict of persecution against the Christians,

Galesburg, a city of Illinois, 53 miles WNW. of Peoria by rail, the centre of a rich agricultural district. It has several foundries, machine-shops, and agricultural manufactories, and is the seat of the Londbard University (Universalist, 1857) and of Knox College (Congregational, 1841). Pop. (1860) 4959; (1880) 11,437.

Galesville, a post-village of Wisconsin, 15 miles ENE. of Winona, with a Methodist university (1855). Pop. 410.

Galgacus, the name Tacitus gives to the Caledonian chief who offered a desperate resistance to the northward march of Agricola (86 A.D.), and was at length disastrously defeated in the great battle of the Grampians.

Galfani, FERDINANDO, an Italian writer on political economy, was born in Chieti, in the Neapolitan province of Abruzzo Citeriore, on 2d December 1728. Although educated for the church, but for the church, but for the church, but for the church, but for the church, his favourite studies were philosophy, history, archaeology, and more especially political economy. He carly gained a reputation as a wit by the publication of a volume parodying, in a sories of dis-courses on the death of the public executionor, the principal Neapolitan writers of the day. About the same time he wrote his first work on political economy, entitled Della Moneta, the leading principle of which is that coin is a merchandise, and that its value and interest ought to be left free, as in other goods. His appointment as secretary of legation at Paris in 1750 brought him into contact with the Encyclopedists and the economic writers of that capital. Five years later he published Dialoghi sul Commercio del Grano ('Dialogues upon the Trade in Corn'), in which he argues against, both the argues present such the against both the extreme protectionists and the pure free-traders. After his recall to Naples in

1769 he became successively conneillor of the tribunal of commerce and (1777) minister of the royal domains. He died at Naples, 30th October 1787. See his Correspondance with Melne. D'Epinax, Holbach, Grimm, Diderot, &c. (1818; new ed. 1881).

Galicia, formerly a kingdom and afterwards a province in the north-west of Spain, bounded N. and W. by the Atlantic, S. by Portngal, and E. by Leon and Asturias, with an area of 11,340 sq. m., has been divided since 1833 into the minor provinces of Cornūa, Lugo, Orense, and Pontevedra, whose joint population in 1886 was 1,919,846. The country is mountainous, being traversed by offsets of the Asturian chain, rising in their highest peaks to about 6500 feet. The westernmost spurs, Capes Ortegal and Finisterre, project into the Atlantie. The numerous short but rapid rivers form small estnaries which alford seeme havens and roads. The principal river is the Minho, which, with its feeder the Sil, is navigable for small vessels on its lower course. Galicia is one of the most fruitful portions of Europe, and has a mild, nourishing climate; but agriculture is in a backward condition, capital is scarce, roads are bad, and railways are few. Rich meadows and dense forests occur everywhere, but the soil is more suited to the cultivation of garden-produce than of corn. Mines of lead, tin, copper, and iron pyrites are worked. The inhabitants, called Gallegos, are a robust, vigorous, industrious race. Great numbers of them annually visit central and southern Spain them annually visit central and southern Spain and Portugal, where they find employment as harvesters, water-carriers, porters, &c. Chief exports, live cattle, preserved meat, egg., minerals, fish, fruits, and giain; imports, coal, oil, hides, spirits, sugar, and tohacco. The principal towns are Santiago di Compostella and the two strongly fortified scaports Coruña and Ferrol. Galicia was a kingdom, under the Snevi from 411 to 585 and a kingdom, under the Suevi from 411 to 585, and again from 1000 to 1071, at which date it was finally incorporated with Leon and Castile.

Galicia (Polish Halicz), a crown-land belonging to the Austrian monarchy, including the former kingdoms of Galicia and Lodomeria, the duchies of Auschwitz and Zator, and the grand-duchy of Cracow, lies between the Carpathians on the S. and Russian Poland on the N., and between Silesia on the W. and Russia on the E. Area, 30,300 sq. m.; pop. (1888) 6,370,837. With the exception of 100,000 Germans and 686,600 Jews, the inhabitants are of Slavonic race, the western part of Galicia being occupied mainly by Poles, the eastern by Ruthenians. In religion about 2½ millions, mostly Ruthemans, belong to the Greek Church, and nearly 21 millions, chiefly Poles, to the Roman Catholic Church. The southern portion of the country is a high terrace, flanking the northern face of the Carpathians. Thence the land slopes away northwards, through a low hilly region, to the deep plains of the Dniester and the Vistula. There are many large rivers—those in the west being feeders of the Vistula, those in the east of the Danube and Dniester. The climate of Galicia is called then that the target was considered. the Danube and Dinester. The climate of Galicia is colder than that of any other portion of the Austrian empire, as it is freely exposed to the north and north-east winds. Yearly mean of temperature at Lemberg, 46'4° F.; mean of July, 66'9'; of January, 25'2'; annual rainfall, about 28 inches. The soil is for the most part fertile, and produces oats, rye, and barley in sufficient quantity for export. Wheat, flax, hemp, tobacco, and oil plants are likewise cultivated. Fruit-growing and market-gardening are prosecuted, also bee-keeping. Horses, cattle, and sheep are raised in considerable numbers. Wolves and bears are still found in the proportioner districts. still found in the mountainous districts. One-fourth of the surface is covered with forests,

which yield large quantities of timber for export. Salt is the most important mineral. iron ore, sulphur, lead, zinc, and petroleum are also extracted. The annual product of the petroleum springs is about 90,000 tons. There are about thirty-five mineral springs, most of them containing sulphur. The industries are few, and, except the manufacture of cloth and the distilling of brandy and of petrolenn, not important. Trade, however, chiefly in the hands of the Jews, is pretty active. Lemberg and Cracow, the prinis pleasy seave. Lember and Crassw, the participal towns, have each a university; the former is the capital of the crown-land. Galicia is ruled by an Austrian governor and an independent diet; to the imperial diet it sends sixty-three members. Galicia takes its name from the old fortiess and town of Halicz, on the Dniester. members. The original Slavonic inhabitants, the Ruthenes, were in the 9th century conquered by the Russians of Kiefl. The western portion of the country was dependent on Poland, and afterwards on Hungary In 1382 it was definitely restored to Poland, and continued to belong to that country till the parti-tion of 1772, when Galicia became one of the crownlands of Austria. In 1846 Cracow, with the territory belonging to it, was given up to the emperor of Austria, and by him (1849) annexed to the crown-land of Galicia.

Galicz. See HALICZ.

Galignani, John Anthony and William, Parisian Imblishers, were born in London, the former 13th October 1796, the latter 10th March former 13th October 1796, the latter 10th March 1798. Their father, an Italian, founded an English library at Paris in 1800, and there published an English Monthly Repertury, and in 1814 the famous newspaper, Galignani's Messenger. The Messenger was much improved by his sons, who made it an important medium for advocating cordiality between England and France. The brothers founded at Corbeil near Paris a hospital for distressed Englishmen; and in 1889 the Galignani Home for decayed members of the printing and bookselling trades was opened at Neuilly. The elder brother died 30th December 1873, and the younger 12th December 1832. December 1882.

Galilee (Heb. Galil, a 'circle' or 'circuit'), a name latterly applied to one of the four Roman divisions of Palestine, originally referred only to a district of the tribe of Naphtali. In the time of our Lord, Galilee embraced the whole northern portion of Palestine from the Meditoranean to the Jordan. of Palestine from the Mediterranean to the Jordan. The district was divided into Upper and Lower Galilee, the former being hilly and well wooded, the latter level and very fertile. At that time it was mainly inhabited by Syrians, Phonicians, Arabs, and Greeks, with a few Jows. The principal towns were Tiberias and Sepphoris; those that figure in the gospels are Cana, Capernaum, Nazareth, and Nain. The Jewish inhabitants were held in low estimation by their brethren in Judea, on account of their less rigid sentiments in regard to religion. After the destruction of Jerusalem the despised Galilee became the refuge of the proud doctors of Jewish law, and the city of of the proud doctors of Jewish law, and the city of Tiberias the seat of Rabbinical learning. The rulus of many fine synagogues are still extant in this region. Galilee now forms part of the pashalic of Damascus, in the Turkish province of Syria, and, as of yore, is remarkable for its beanty and fertility. It still has a considerable number of Jewish inhabitants. See Dr S. Merrill, Galilee in the Time of Christ (new ed. 1885).

The Sea of Galilee, called also in the New Testament the Lake of Gennesaret and the Sea of Chinnerth or Cinnerath, a large lake in the porther rulus of many fine synagogues are still extant in

nereth or Cinneroth, a large lake in the northern half of Palestine. Lying 626 feet above sea level,

it is 13 miles long by 6 broad, and 820 feet deep. It occupies the lottom of a great basin, and is undoubtedly of volcanic origin. Although the Jordan runs into it red and turbid from the north, and many warm and brackish springs also find their new thither, its waters are cool, clear, and sweet. Its shores on the east and north sides are bare and rocky; on the west sloping gadually, and invariantly covered with vegetation. The surrounding scenery is hardly beautiful, but its surrounding scenery is narray beauting, into its associations are the most sacred in the world. It is enough to mention the names of some of the towns on its shores, Bethsaida, Capernaum, Magdala, and Tiberias. In the time of Jesus the region found about was the most densely populated in Galilee; now even its fisheries are almost entirely neglected.

Galilee, the name applied to a porch or chapel attached to a church, in which penitents stood, processions were formed, and corpses deposited for a time previous to interment. In some religions houses the galilee was the only part of the church accessible to women; the monks came to the galilee to see their female relatives—the women being told in the words of Scripture, 'He goeth before you into talilee; there shall you see him (Matt. XXVIII. 7). A portion of the nave was sometimes marked off by a step, or, as at Dinham, by a line of blue marble, to mark the boundary to which women were limited. There are galilees in the cathedrals of Lincoln (on west side of south transepti, Ely (at west end of uave), and Durham (west end of pave).

Galile'i, GALILE'O, one of the fathers of experimental science, was born at Pisa on the 18th of February 1561. By the desire of his father, the descendant of an ancient Florentine family, Galileo directed his early studies to medicine, and of course the prevailing Aristotelian philosophy; but the dogmas of this last he soon ventured to dishelieve and despise. Entering the university of Pisa in 1581, he made there two years later one of his most important discoveries. Happening to observe the oscillations of a bionze lamp in the cathedral of Pisa, he was struck with the fact that the oscillations, no matter what their range, seemed to be accomplished in equal times. The correctness of this observation he at once proceeded to test, and then, comparing the beat of his own pulse with the action of the pendulum, he concluded that by means of this equality of o-cillation the simple pendulum might be made an invaluable agent in the exact measure ment of time, a discovery which he utilised some fifty year, later in the construction of an astronomical clock. About this time his irrepressible bias towards mechanical constructions and experimental science received a new impulse from his introduction to the principles of mathematics. The first fruit of his ardent pursuits of the new studies was the invention of a hydrostatic balance and the composition of a treatise on the specific gravity of solid bodies. These achievements seemed him the appointment of professor of Mathematics in the appointment of professor of Mathematics in the university of Pisa, where he propounded the novel theorem, that all falling bodies, great or small, descend with equal velocity, and proved its correctness by several experiments made from the summit of the leaning tower of Pisa. This provoked the appoints of the Initiatelians whose lifterness was enmity of the Aristotelians, whose bitterness was exacerbated by the cutting sarcasms of the successful demonstrator. Nevertheless Galileo in 1591 deemed it prudent to resign his chair at Pisa, and retire to Florence, though another cause has been regigned for his resignation and the last

chair of Mathematics in the university of Padna. where his lectures attracted crowds of pupils from all parts of Europe. Here he taught and worked for eighteen years, from 1592 to 1610. It may be remarked parenthetically that he was the first to adapt the Italian idiom to philosophical instruc-Among the various discoveries with which he enriched science may be noticed a species of thermometer, a proportional compass or sector, and, more important than all, the refracting telescope for astronomical investigation. This last, however, he seems not to have invented entirely This last, independently: an account of an instrument for enlarging distant objects, invented by a Dutchman, seems to have reached him whilst on a visit to Venice in May 1609; thereupon setting his inventive with to work, he constructed an apparatus involving the principles of the telescope. Rapidly improving the construction of his original instrument, Galileo now began a series of astronomical investigations, all of which tended to convine him still more of the correctness of the Copernican heliocentric theory of the heavens, of the truth of which he seems indeed to have been early persuaded. He concluded that the moon, instead of being a telf luminary and perfectly enough scales. being a self-liminous and perfectly smooth sphere, owed her illumination to reflection, and that she presented an unequal surface, diversified by valleys and mountains. The Milky-way he pronounced as track of countless sources stars. aud mountains. The Milky-way he pronounced a track of countless separate stars. Still more important, however, was the series of observations which led to the discovery of the four satellites of Jupiter on the night of the 7th of January 1610 (though it was not till the 13th of the same month that he came to the conclusion that they were satellites, and not fixed stars), which he named the Medicean stars, in honour of his protectors, the Medici family. He had a fixed stars and the fixed stars are stars and the fixed stars are stars and the fixed stars. named the Medicean stars, in honour of his protectors, the Medici family. He also first noticed movable spots on the disc of the sun, from which he inferred the rotation of that orb. In this year he was recalled to Florence by the Grand-duke of Tascany, who nominated him his philosopher and mathematician extraordinary, gave him a good salary, and exacted from him no duties save those of prosecuting his scientific input first icense. of prosecuting his scientific investigations untrainmelled. At Florence, continuing his astronomical observations, he discovered the triple form of Saturn and the phases of Venus and of Mars.

Saturn and the phases of venus and of Mars.

In 1611 Galileo visited Rome and was received with great distinction, being enrolled a member of the Lincei Academy. Yet the publication, two years later, of his Dissertation on the Solar Spots, in which he openly and boldly professed his adhesion to the Companion when we would acquire him the to the Copernican view, provoked against him the censure and warning of the ceelesiastical authorities. But this he partly brought upon himself by his aggressive attitude towards the champions of orthodoxy and even towards the Scriptures, whose astronomical system he hesitated not to challenge. Galileo, however, promised (26th February 1616) to ober Pope Paul V's injunction, thenceforward not to 'hold, teach, or defend' the condamned doctory of the condamned doct trines. After that he seems to have been again taken into favour by the pope and other high dignitaries of the church; indeed personally he seems never his pledge, he published the Dialogo sopra i due massimi Sistemi del Mondo, a work written in the form of a dialogue between three fictitions interlocutors, the one in favour of the Copernican system, the second an advocate of the Ptolemaie, and the third a well-meaning but stupid supporter of the Aristotelian school. Hardly had the work ami retire to Florence, though another cause has been assigned for his resignation—viz. that he ridiculed the mechanical pretensions of Giovanni de Medici, son of Cosmo I.

In the following year he was nominated to the been issued when it was given over to the jurisdiction of the Inquisition. Pope Urban VIII., previously Cardinal Barberini, a friend and admirer of Galileo, was led to believe that Galileo had satirised him in this work in the parameter of the third inter-

locator, as one who was careless about scientific lection, as one who was careless aroun scientific right, and who timidly adhered to the rigid traditions of antiquity. In spite of his seventy years and heavy infirmities Galileo was summoned before the Inquisition, and, after a wearisome trial and incarceration, was condemned to abjure by oath on his knees the truths of his scientific creed. the year 1789 a legend has been current to the effect that on concluding his recantation he exclaimed, sotto vocc, 'E pur si muove' (Nevertheless it does move). The question whether he was put to the torture or no has given rise to a keen controversy, it which so the state of the second very second in which neither side can justly claim to have offered evidence that is finally conclusive. He was certainly subjected to the cxamen rigorosum, the last stage of which is actual torture. But the official accounts of the trial make no mention of this last stage having been reached. On the other hand, it has been asserted that the records of his trial have been tampered with. Galileo was further sentenced to an indefinite term of imprisonment in the dungeons of the Inquisition; but this was commuted by Pope Urban, at the request of Ferdinand, Duke of Tuscany, into permission to reside at Siena, and finally at Florence. In his retreat at Arcetri, near Florence, he continued with unflagging ardour his learned researches, even when hearing grew enfeebled and sight was extinguished. Just before he became totally blind, in 1637, he made yet another astronomical discovery, that of the moon's monthly and annual librations. He died on the 8th of January 1642, and was interred in the church of Santa Croce, the pantheon of Florence. His disposition was genial; he enjoyed the social wit and banter of his chosen friends; and the resulting with which he offered or accorded atoms. readiness with which he offered or accepted atonement modified a somewhat irascible disposition. The great deficiencies in his character were a want of tact to keep out of difficulties, and a want of moral courage to defend himself when involved in them. His biting satirical tongue, more than his physical discoveries, was the cause of his misfortunes. He loved art, and cultivated especially music and poetry. Ariosto he knew almost by heart, and appreciated keenly the beauties of this classic. Tasso, on the other hand, he unduly depreciated, and severely criticised him in Considerated. racioni al Tasso. His own style is nervous, flowing, and elegant. In addition to the discoveries and inventions already recorded we owe to the genius of Galileo the formulation of the law of uniformly accelerated motion in the case of hodies falling freely towards the earth, the determination of the parabolic path of projectiles, the theory of virtual velocities, and the law that all bodies, even invisible ones like air, have weight. The best edition of Galileo's collected works is that by Alberi (16 vols. Flor. 1842-56).

See Viviani's Life of Galileo (1654); Henri Martin's Galilée (1868); H. de l'Épinois in Revue des Questions Historiques (1867), and Les Pièces du Procès de Galilée (1877); Gebler, Galileo und die Römische Curie (1876); Berti, Copernico e Sistema Copernicano, and Il Processo Originale di Galileo (1876); Wollwill, Ist Galilei yefoltert norden! (1877); Favaro, Galileo Galilei (2 vols. Flor. 1882); Wegg-Prosser, Galileo and his Judyes (1889).

Galingale, a name often applied to the tubers of Cyperus longus, and sometimes to the whole plant. The tubers are of ancient medicinal repute, and are sometimes still eaten as a vegetable in Greece. See Cyperus.

Galion, a town of Crawford county, Ohio, at the junction of several railways, 58 miles N. by E. of Columbus, with several cigar-factories and machine-shops, two railroad-shops, and a foundry. Pop. 5635.

Galipea. See Angostura Bark.

Galitzin, also Gallitzin, Galyzin, or Goly-ZIN, one of the most powerful and distinguished Russian families, whose members, too numerous to catalogue, have been equally prominent in war and diplomacy from the 16th century downwards.— VASILI, surnamed the Great, born in 1643, was the conneillor and favourite of Sophia, the sister of Peter the Great, and regent during his minority. His great aim was to bring Russia into contact with the west of Europe, and to encourage the arts and sciences in Russia. His design to marry Sophia, and plant himself on the Russian throne, miscarried. Sophia was placed by her brother in a convent, and Vasili banished (1689) to a spot on the Frozen Ocean, where in 1714 he dicd.— DIMITRI (1735—1803), Itnssian ambassador to France and Holland and intimate friend of Voltaire and Diderot, and the Encyclopredists, owes the preservation of his name mainly to his wife, the celebrated AMALIE, PRINCESS GALITZIN (1746-1806), daughter of the Prussian general, Count von Schmettan. She was remarkable for disposition, her sympathetic relations with scholars and poets, but, above all, for her ardent piety, which found in Catholicism its most congenial sphere. Having separated from her husband, she took up her residence in Minster, where she gathered round her a circle of learned companions, including for a longer or shorter time Jacobi, Hemsterhuis, Hamann, and Count Stolberg.—DIMITRI AUGUS-TINE, son of the foregoing, was born at the Hagne, December 22, 1770. He became a Roman Catholic December 22, 1770. He became a Roman Catholic in his seventeenth year; and, through the influence exercised over him by a clerical tutor during a voyage to America, he resolved to devote himself to the priesthood. In 1795 he was ordained a priest in the United States by Bishop Carroll of Baltimore, and betook himself to a bleak region among the Alleghany Mountains, in Pennsylvania, where he was known as 'Father Smith' (Smith being originally a corruption of Schmettau). Here he laid the foundation of a town, called Loretto, where he died 6th May 1840. He declined to return to Russia on his father's death, and as a Catholic priest was adjudged to have lost his right of inheritance. He was for some years vicar general of the diocese of Philadelphia. He was austere in his mode of life, but liberal in the highest degree ns mode of me, but there is the inguest degree to others, and an affectionate and indefatigable pastor. He wrote various controversial works, including a Defence of Catholic Principles (1816), Letter to a Protestant Friend (1820), and Appeal to the Protestant Public (1834). See the Lives by Heyden and by Brownson.

Galium. See BEDSTRAW.

Gall. A synonym for Bile (q.v.), the secretion of the Liver (q.v.). See also Galls.

Gall, Franz Joseph, the founder of phrenology, was born at Tiefenbronn, near Pforzheim, on the borders of Baden and Wirtemberg, 9th March 1758. He studied medicine at Strasburg and Vienna, and settled in the latter city in 1785 as a physician. From his boyhood he had been attracted by the problems arising out of the relations between the powers of mind, the functions of the brain, and the external characters of the cranium. In 1796 he began to give courses of lectures on Phrenology (q.v.) in Vienna; but the lectures were prohibited in 1802 by the Austrian government as being subversive of the accepted religion. Along with Spurzheim (q.v.), who became his associate in 1804, Gall quitted Vienna in 1805, and began a lecturing tour through Germany, Holland, Sweden, and Switzerland. He reached the height of his fame when in 1807 he settled as a physician in Paris. On 14th March 1808 he and

Spurzheim presented to the Institute of Fiance a memoir of their discoveries, on which a committee of the members of that body (including Pinel, Portal, and Cuvier) drew up an unfavourable Report. Therenjon Gall and Spurzheim published their memoir, Introduction an Cours de Physiologie du Cerrour; this was subsequently followed by Recherche, sur le Systeme Nerveur (1809), and by Anatomir et Physiologie du Systeme Nerveur (4 vols. 1810-19), with an atlas of 100 plates. But, the two platenologists having parted in 1813, the mane of Gall alone is prefixed to vols. 3 and 4; and it alone is borne by a reprint of the physiological portion of the work, entitled Sur les Fonctions de Cercau, et sur celles de chacune de ses Parties (6 vols. 1825). In 1811, in answer to accusations of materialism and fatalism brought against his system, Gall published Des Dispositions Innees de l'Ame et de l'Esprit. He continued to practise medicine and pursue his rescarches at Montrouge, near Paris, till his death, 22d August 1828.

Gall. St. See Sr Gall.

Gallait, Lorts, a Belgian historical painter, was bout at Tournay in 1812, and has become famous by pictures on subjects from the history of the Low Countries, such as 'The Abdication of Charles V.' (1841), 'Alva viewing the dead bodies of Egmont and Honi' (1851), and 'The Plague of Tournay' (1882), which has the Brassels Museum purchased for £4800. He is a member of many academies at home and abroad.

Galland, Antoine, a French orientalist and archaeologist, was born 4th April 1646, at Rollot, near Monthidier, in Picardy. Attached in 1670 to the French embassy at Constantinople, he three years later accompanied the ambassador De Nointel to Syria and the Levant. In 1676, and again in 1679, he made other visits to the East, where he gathered valuable collections of antiquities, and acquired a good knowledge of oriental languages. In 1701 he was made a member of the Academie des Inscriptions, and in 1709 professor of Arabic in the College de France. He died at Paris, 19th February 1715. The greatest part of Galland's writings relate to archaeological subjects, especially to the numismatics of the East; but the work which has secured him the greatest reputation is his translation of the Arabian Nights in 12 vols. (Les Millet Une Nuits, Paris, 1704-8), the first translation of these stoties made into any language of Christendom (see Ahabian Nights). Among his other writings we may mention Paroles Remarquables, Bons Mots, et Maximes des Orientaux (1694), and Les Contes et Fables Indicances de Bidpar et de Lobraan (2 vols, 1724). See also Journal d'Antoine Galland pendont son sejour a Constantinopte, 1672-75, edited by Ch. Schefer (2 vols, 1881).

Galla Ox, or SANGA, a remarkable species or variety of ox inhabiting Abyssinia. The chief peculiarity is the extraordinary size of the horns, which rise from the forehead with an outward and then an inward curve, producing a very perfect figure of a lyre, and finally curve a little outwards at the tip, to which they taper gradually.

Gallas, a race of people inhabiting that part of Africa which lies to the south and west of Harar and south of Shoa, between 9° and 3° S. lat. and 34° and 44° E. long. Their racial affinities are not yet conclusively settled; the best authorities regard them as belonging to the Ethiopic branch of the Hamites, and their language as a descendant of the ancient Geez of Alyssinia. Individually they are of average stature, with strong, well-made limbs, skin of a light chocolate brown, hair frizzled but not woodly. Though cruel in war, they are of frank disposition, and faithfully keep their pro-

mises and obligations. They are distinguished for their energy, both physical and mental, especially those tribes, to the south and south-west, which pursue pastoral avocations, notably the breeding of houses, asses, sheep, cattle, and camels, and those which live by hunting, especially the dephant.

These same tribes are mostly still heathens, though Mohammedanism is rapidly making way amongst them. The more northerly tribes who dwell about Harar profess a crass form of Christianity, derived from Abyssinia, and for the most part practise agriculture, raising cotton, durra, sugar, and coffice. The total (falla population, who call themconce. The total trails population, who call themselves Argatta or Oromo, is approximatively estimated by Reelns at 31 millions; the nothern tribes are put by Paulitschke at 11 million. Politically they are divided into a great number of separate tribes (Itn, Arnssi, Nole, Jarsso, Ala, Ennia, Walamo, Borana, &c.), which are frequently at war with one another. But their inveters agantary long fees are the Sampli on the parthy ate century-long foes are the Somali on the northeast and east, who have gradually driven back the Gallas from the shores of the Red Sea and the extremities of the Somali peniusula, regions which were occupied by them in the 16th century, just as on the other side the Abyssinians and Shoaus have beaten them back southwards. The country they now inhalit is, generally speaking, a plateau that slopes south eastward to the Indian Ocean, and has a hilly, well-timbered surface. On the north, from Harar to the Hawash, stretches the watershed dividing the rivers that flow to the Red Sea and to the Indian Ocean, and enhanting in two line-stone massifs (7250 feet), called Concuda and Gara Mulata. The watershed separating the rivers Webi (with its tributary the Ener) and Wabi (also ealled Juba), which flow south-east to the Indian Ocean, from the feeders of the Upper Nile region, skirts the western side of the Galla territory. region, with plenty of rains and running streams, a rolling surface diversified with hill-chains, and abundant vegetation, is well cultivated, and yields wheat, barley, beans, sorghum, sweet notatoes, flax, lentils, cotton, and coffee. Its average eleva-Max, lentils, cotton, and coffee. Its average elevation is 7200 feet. Amongst all the western tribes inhabiting this region slavery is a recognised institution. See Paulitsehke, Ethnographic und Anthropologie der Sonal, Galla, und Harari (Leip. 1886), and in Globus, 1889, and Cecchi, Fra Zeila alle Frontiere del Caffa (2 vols. Rome, 1885).

Gallatin, Albert, financier and statesman, was born at Geneva in 1761, and graduated at the university there in 1779. In 1780 he went to the United States, where he engaged in trade, and was for a time teacher of French in Harvard College. Afterwards he purchased land in Virginia and Pennsylvania, and made his entrance into political life in the latter state in 1789. In 1793 he was elected to the United States senate, and in 1795 entered congress. In 1801-13 he was Secretary of the Treasury, in which post he was of signal service to his adopted country, and showed himself one of the first linanciers of his day. He took an important part in the negotiations for peace with England in 1814, and signed the treaty of Ghent. From 1815 to 1823 he was minister at Paris, and in 1826 he was sent to London as amhassador-extraordinary. On his return in 1827 he settled in New York, and devoted much of his time to literature, being chiefly occupied in historical and ethnological researches. He was one of the founders and the first president of the Ethnological Society of America; and from 1843 to his death he was president of the New York Historical Society. He died Angust 12, 1849. His works include publications on finance, politics, and ethnology; among these last are The Indian Tribes

cast of the Rocky Mountains, &c. (1836), and Notes on the Somi-civilised Nations of Mexico, Yucatan, and Central America (1845). See the Lives by Henry Adams (1879) and J. A. Stevens (in the 'American Statesman' series, 1883).

Gallaudet. See Deaf and Dume. Gall-bladder. See Liver.

Galle, or Point de Calle, a fortified town and scaport of the south-west extremity of the island of Ceylon, stands on a low rocky promontory of the same name, and has a good harborr, formed by a small bay. It has lost its former importance as a coaling and transhipping station for the great lines of steamers from Europe to Australia and China since the completion of the breakwater at Colombo (q, v). It is the capital of the southern province of Ceylon. Pop. (1881) 31,743. See CEYLON,

Galle'go, one of the principal affluents of the Ebro (q.v.).

Galleon (Spanish), a large ship formerly used by the Spaniards to carry home the gold, silver, and other wealth contributed by the Mexican and South American colonies. They were armed, and had usually three or four decks, with bulwarks three or four feet thick, and stem and stern built up high like castles. They had a particular fascination for Drake and other Elizabethan rovers, who so contrived that many of them never reached the ports of Spain.

Gallery, a word with several applications in architecture. A long passage or corridor is called a gallery. A long room, such as is frequently used for exhibiting pictures; a raised floor in any apartment, supported on pillars; a long passage in the thickness of the wall, or supported on cantilevers (as the Whispering Gallery of St Paul's)—all these are called galleries. They were of very frequent use in the buildings of the middle ages. The Roodloft (q.v.) is a gallery running across a church at the entrance to the choir, and supporting a large cross. Organ galleries are also frequent, either in the position of the roodloft, or at one end of the nave or transept, or corhelled out from the side-wall. In old baronial halls the end next the door was usually screened off as an entrance passage, and above the screen was almost invariably a gallery for unusicians. In Scottish castles such a gallery was frequently constructed in the thickness of the wall. In the older German and French churches the side-aisles were divided into two stories—the upper forming a gallery said to be for the exclusive use of the women. The arrangement of galleries in tiers one over the other, now so much used in churches, theatres, &c., is entirely nodern, dating from the 17th century. For galleries in the military and mining connection, see Mines.

Galley, a long, narrow row-boat, carrying a sail or two, but dependent for safety and movement mainly upon oars. These boats were called galleys, galleots, and brigantines (or frigates) according to their size: a galleot is a small galley, while a brigantine is still smaller. The number of men to each oar varied according to the vessel's size: a galley had four to six men working side by side to each oar, a galleot but two or three, and a brigantine one. A galley was 180 or 190 spans (of 9 to 10 inches) long, and its greatest beam was 25 spans broad. Such a vessel carried two masts—the albero maestro or mainmast, and the trinchetto or foremast, each with a great lateen sail. The Genoese and Venetians set the models of these vessels, and the Italian terms were generally used in all European navigation till the northern nations took the lead in sailing ships. These sails were

often clewed np, however, for the mariner of the 16th century was ill-practised in the art of tacking, and very fearful of losing sight of land for long, so that nuless he had a wind fair astern he preferred to trust to his oars. A short deck at the prow and poop served, the one to carry the lighting men and trumpeters and yard-men, and to provide cover for the four guns; the other to accommodate the knights and gentlemen, and e-pecially the admiral or captain. Between the two decks, in the ships waist, was the propelling power—say fifty-four benches or banks, twenty-seven a side, supporting each four or five slaves, whose whole business in life was to tag at the fifty-four oars. If a Christian vessel, the rowers were either Turkish or Moorish captives, or Christian convicts; if a Barbary corsair, the rowers would all be Christian prisoners.

Sometimes a galley-slave worked as long astwenty years, sometimes for all his inisciable life, at this fearful calling. The poor creatures were chained so close together on their narrow bench that thry could not sleep at full length. Sometimes seven men (on French galleys, too, in the 18th century) had to live and sleep in a space 10 feet by 4. Between the two lines of rowers ran the bridge, and on it stood two boatswains armed with long whips, which they laid on to the bare loneks of the rowers with merciless severity. Biscuit was made to last six or eight months, each slave getting 28 onnees thrice a week, and a spoonful of some mess of rice or bones or green stuit. The water-cans under the benches were too often foul. The full complement of a large galley included, besides 270 rowers and the captain, chaplain, doctor, scrivener, loatswains, and master or pilot, ten or fifteen gentlemen adventurers, friends of the captain, shaing his mess, and berthed in the poop, twelve helmsmen, six foretop able-bodied seamen, ten warders for the captives, twelve ordinary seamen, four gunners, a carpenter, smith, cooper, and a couple of cooks, together with fifty or sixty soldiers, so that the whole equipage of a fighting galley must have reached a total of about four hundred men.

What is true of a European galley is also generally applicable to a Barbary galleot of eighteen to twenty-four oars, except that the latter was generally smaller and lighter, and had commonly but one mast and no castle on the prow. The crew of about two lundred men was very densely packed, and about one hundred soldiers armed with muskets, bows, and scimitars occupied the poop. The rowers on Barbary galleys were generally Christian slaves belonging to the owners, but when these were not numerons enough other slaves, or Arabs and Moors, were hired. The complement of soldiers, whether volunteers or Ottoman janissaries, varied with the vessel's size, but generally was calculated at two to each oar, because there was just room for two men to sit beside each bank of rowers. They were not paid unless they took a prize, nor were they supplied with anything more than biscuit, vinegar, and oil—everything else they found themselves. Vinegar and water with a few drops of oil on the surface formed the chief drink of the galley-slaves, and their food was moistened biscuit or rusk and an occasional mess of gruel.

A galleass was originally a large, heavy galley, three-masted, and fitted with a rudder, since its bulk compelled it to trust to sails as well as oars. It was a sort of transition-ship between the galley and the galleon, and as time went on it became more and more of a sailing ship. It had high bulwarks with loopholes for muskets, and there was at least a partial cover for the crew. The Portuguese galleys in the Spanish Armada mounted each 110 soldiers and 222 galley-slaves; but the Neapolitan galleasses carried 700 men, of whom 130 were sailors, 270 soldiers, and 300 slaves of the

oar. In France the convict galleys were gradually superseded from 1748 by the Bagnes (q.v.). John Knox laboured for eighteen months at the oar, and St Vincent de Paul (q.v.) did much for the galley-slaves. See also TRIREME, SHIPBUILDING.

Furttenbach, Architectura Navalis; S. Lane-Poole, The Barbary Corsairs ('Story of the Nations'); and M. Oppenheim, in Gentleman's Magazine (1885).

Gall-fly, or Gall-wasp, names generally applied to any member of a large family (Cynipide) of Hymenopterons insects, most of the females of which lay their eggs in plants and by the associated irritation produce galls. The insects are not unlike little wasps, with straight, thread-like antenne, laterally compressed abdomen, and long wings. The eggs are laid in the leaves, twigs, roots, &c.



Fig. 1.—Bedeguar Gall of Wild Rose.

The eggs are laid in the leaves, twigs, roots, &c. of plants, which the mothers pierce with their ovipositors. The irritation of the wound and of the intruded and rapidly developing eggs results in pathological excrescences or galls. Within these the larve feed and grow, and either cat their way out while still grubs or remain till the pupa stage is past and emerge as adolescent insects. A gall may contain a single egg and larva or many, and both external form and internal structure vary widely.

Each gall-fly has its favourite or exclusive host, and usually restricts its egg-laying to some special part of the plant. While most produce true galls, some members of the family act like enckoos and utilise galls already formed by other genera. Others again depart more widely from the general habit and deposit their ova in other insects. The genera Cynips, Aphilotnix, Andricus, Neuroterus, Spathegaster, Biorhiza all form galls on oaks; Rhodites is the cause of mossy excrescences on rose bushes. Among those which utilise already formed galls Synergus and Anlax are important genera; while Ibalia, Figites, Eucoila, and the minute species of Allotria are in their youth parasitic on other insects such as flies and plant-lice.

The reproductive relations of gall-flies are very interesting: in many cases parthenogenesis undonbtedly occurs; in some species—e.g. of Rhodites, no males have ever been found; in other forms the



Fig. 2.

a, oak gall produced by Cymips quercus-folii; b, section of gall; c, gall-insect (Cymips quercus-folii).

males when they occur are very few in proportion to the females. It must be cumphasised that many gall-wasps distinguished by entomologists as sepa-

rate species or even referred to different genera have turned out to be the parthenogenetic and the sexual forms of one species. A common life-listory is as follows: (a) Out of a summer-gall male and female forms emerge; (b) the females hay their fertilised eggs and give origin to winter-galls in so doing; (c) from these winter-galls there arise parthenogenetic females which in their egg-laying produce the summer-galls from which we started.

thenogenche females which in their egg-hying produce the summer-galls from which we started.

Among the common gall-wasps Cynips guerensfolii makes the cherry-galls of oak leaves; C. tinctoria produces the well-known ink-gall of the Levantine oak; Rhodites rosa forms the curious and familiar Bedeguar' (q.v.) excrescence on wild

See Galls, Ink, Insict, Parthenogenesis. For the life-histories, see Adler, Zeitsch. f. wiss. Zoologie, xxxv. (1881); Annals and Magazine of Natural History (5th series, vol. viii.); Bassett, Canad. Entomologist (1873-75, p. 91); W. K. Brooks, Hereday (Baltimore, 1883).

Galliard, the name of a lively dance, the same, according to Brossard, as the Romanesca, a favourite dance with the Italians. The air is mostly in g or q time, but sometimes also in g or q time. The tempo is also quick and lively, with a dlawing melody. Many galliard times are still extant, distinguished by such names as The King of Deumark's Galliard, The Earl of Essee's Galliard, and the like. The word is due to the Spanish gallarda, of dubious origin; Diez refuses to connect it with galu and gallant (Span. galante) on account of the double t and the French form gallard, itself most likely of Celtic origin.

Gallic Acid, IfC₇H₂O₂,H₂O₃ is an acid which exists in small quantity in gall-nuts, in valonia (the acorn-cup of Quereus agilops), in dividivi (the pod of Casalpinia coriaria), in swamch, and other vegetables. It is usually prepared from gall-nuts, which, in addition to gallic acid, contain a large proportion of tannin (tannic acid or gallotamic acid). When the gall-nuts are digested with water for some weeks fermentation takes place, and the tannic acid is gradually converted into gallic acid. The same result is obtained more quickly if sulphuric acid be present. To obtain pure gallic acid the gall-nuts are boiled with water, and the hot liquor separated. On cooling gallic acid crystallises out, and is further parified by solution in hot water and treatment with animal charponl.

It forms delicate, silky, acientar crystals, nearly colourless, and having a sourish taste. It is soluble in 3 parts of boiling water, but only in 100 of cold water, and on this account it can be readily purified by recrystallisation. With solution of iron salts (ferric) it produces a blue-black colour, and finally yields a black precipitate on exposure to the air. Hence it may be used in the production of ink, for which purpose it has some advantages over tannin or gall-nuts. When the crystals are strongly heated pyrogallic acid is produced and sublines over. Gallic acid is a useful astringent. As it does not congulate albumen it is readily absorbed into the blood, and in this way it is efficacious in Bright's disease. Where a decided local astringent effect is desired tannic acid is much more powerful.

Gallican Church, the designation applied to the Catholic Church in Prance, in respect of the more or less independent attitude which it formerly occupied toward the Roman see.

Flourishing Christian communities already existed at Lyons and Vienne at the time of the persecution under Marcus Aurelius, when the aged bishop Pothimas was martyred (177). The origin of these churches is traced principally to Asia Minor, where Ireneus (q.v.) was born, and they were in intimate connection with Smyrna and other churches of the East. The historian Gregory

of Tours (6th century) speaks of seven missionary bishops sent to Gaul from Rome, of whom Saturnians settled at Toulouse, Dionysins at Paris, and Trophinus at Arles. Probably his account is a combination of various local traditions of the first bishops of important towns with a much earlier narrative of the martyrdom of Saturnians under Decins (250). Although sharing in the general literary inferiority of Western ecclesiastics during the early period, the church of Gaul numbers several eminent names in the literature of the 3d, 4th, and 5th centuries. The works of Ireneus, Salpicius Severus, Hilary of Poitiers, Hilary of Arles, Vincent of Lerius, Prosper, Vietor, Eucherius, Salvian, and Gregory of Tours combine to form a body of literature of which the later French Church is not unreasonably preud. The hierarchical organisation of the church in Gaul was from an early period among the most complete and regular in western Christendom; and in the council held at Arles in 314 we may recognise the titles of many hishops of sees which are still represented in the episcopate of

But the history of the Gallican Church, so far as regards the development of those peculiar principles which have acquired the distinctive name of ' (dallieanism,' begins at a much later period. From circumstances which are differently viewed by the opposite schools of theology, the papacy began, from the very date of the establishment of the Western Empire, to exercise a large influence over the civil as well as ecclesiastical affairs of the several European kingdoms. On the other hand. owing to the intimate connection between the church and state in most of these kingdoms, and especially to the fendal relations between the crown and the clurch dignituries, the crown also asserted a correlative claim to certain privileges in respect of ecclesiastical affairs. The satisfactory adjustment of these conflicting claims was the great problem of medieval polity; and the alternations of the struggle between them form the staple of medieval history. In the church of France the party maintaining the prerogatives of the French crown and the privileges of the national church of France against the adverse claims of the Roman see gave to the principles which they professed the name of Gallicanism. This name has come to designate, in general, that system in Roman Catholic theology which, while it recognises the primacy of the Roman pontiff, by divine right, over the universal church, yet asserts the independence of national churches in many details of self-govorn-ment and of local discipline, and limits the papal prerogatives by canons and decrees of general councils and by the laws of the universal church. It must be added that, while the Gallican theory te this extent claims exemption from the authority of the pope, it acquiesces, to an almost proportionate degree, in the assumption of celesiastical authority on the part of the state.
We can recognise the working of these principles

We can recognise the working of these principles in the opposition which the so-called Isidorian decretals (see Canon Law) encountered in France. They were embedded, during the reign of St Louis, in the Pragmatic Sanction of 1269, which provided that the administration of the church should be in conformity with 'the common law, the camens of Councils, and the statutes of the ancient Fathers.' They were carried to their extreme extent by Philippe le Bel in his contest with Boniface VIII. The conflicting claims of the rival popes in the Western schism tended still more to weaken the papal authority; and the expedient of convening a general council to pronounce upon these claims gave prominence to one of the leading dogmas of Gallicanism—the superiority in point of authority of a general council to the pope. The

disciplinary enactments of the councils of Coustanee and Basel were mainly directed towards the limitation of the papal authority in the exercise of church patronage; and these enactments were in the main embodied in the French law by the celebrated Pragmatic Sanction (q.v.) of Bourges in 1437.

The Pragmatic Sanction was superseded in 1516 by the Concordat of Bologna between Lee X. and by the Concordat of Bologna between Lee X. and Francis I. This treaty gave the nomination of bishops to the crown, and the right of instituting them to the pope, but it was with the greatest reluctance, and only 'at the express command of the king,' that the Parlement of Paris registered (1518) the papal bull that condemned the Pragmatic Sanction. The purely Gallican principles of the councils of Pisa, Constance, and Basel still remained the standard expression of French convictions as to the rightful position of the clurch. victions as to the rightful position of the church. The great jurists Pitheu and Dupin, in asserting the liberties of the church, equally enforced the privileges of the crown. It was a contest between Louis XIV. and Innocent XI, regarding the so-called right of Regalia—the right claimed by called right of Regalia—the right claimed by kings of receiving the revenues of a hishopric during a vacancy, and of presenting to benefices pending a new appointment—that led to the famous Declaration of the French Clergy in 1682, which has since been regarded as the charter of Gallicanism. This forumlary emanated from an extraordinary assembly of 35 bishops and 35 other clergy convened by royal anthority at Paris, 19th March 1682. It was drawn up by Bossuet, and consists of four articles. The first declares that the jurisdiction of St Peter and his successors in the Roman see as vicars of Christ on earth, although divinely bestowed, is confined to things spiritual and appertaining to salvation, and does spiritual and appertaining to salvation, and does not extend to civil or temporal affairs. The article therefore declares 'that princes are not subject in temporal things to any ceclesiastical authority;' that they cannot be deposed 'cither directly or indirectly by the power of the keys, and that their subjects cannot be dispensed from their subjection or released from their allegiunee. The subjection or released from their allegiunce. second article renews the declaration of the Conneil of Constance with regard to the superiority of a general council over the pope, and declares that that article is not to be restricted in its application to a period of schism such as existed at the time of the council. The third asserts that the authority of the pope is 'to be restricted by the canons of the universal church,' and that 'the rules, customs, and institutions of the Gallican kingdom and church remain in full force.' This is the article which asserts the celebrated 'Gallican Liberties.' The fourth article, while it concelles to the pope the chief part in questions of faith,' and professes that 'his decrees oxtend to each and every church,' nevertheless maintains 'that his judgment is not irreformable, unless it shall have been confirmed by the consent of the entire church.' The chief rules, customs, and institutions of the Galliean Church referred to in the third article are, that the Gallican Church does not receive all the decrees of councils and of popes in matters of discipline, and that those only are in force which are so received; that the Gallican Church holds itself free to receive or reject the rules of the Roman chancery; that the Roman pontiff cannot levy any impost from the French clergy without their own consent; that he cannot bestow of his own motion on a foreigner any benefice within the French Church; that neither he nor his legates can hear French causes in 'the first instance, and that in cases of appeal he is bound to assign native judges to hear the appeal, even if the appellant should be a metropolitan or primate; that the French bishops shall not be required to attend any general council except with the permission of

the crown. The last of these 'customs,' as also those which make the receiving or not receiving the general canons of discipline optional in France, and which practically throw the decision into the hands of the civil power, have been with much show of reason denominated the 'Slaveries' rather than

the 'Liberties' of the Gallican Church.

This Declaration was strenuously enforced for the next ten years by Louis XIV. It was condemned by Pope Alexander VIII. in 1690, by Clement XI. in 1706, and again by Pius VI. in 1794; but both the acceptance of the articles and their condemartion were understood to be with certain reservations. The Gallican Church underwent very extensive modifications at the close of the 18th and the heginning of the 19th century. The enactment in 1790 of the 'civil constitution of the clergy' introduced a large infusion of the democratic element. The church was first seen-larised, and then swept away, till Bonaparte, as First Consul, restored it in a fresh concordat with the pope (1801). Yet the conflict with Rome still continued, and in 1810 a decree of the emperor made the declarations of 1682 once more the law of France. Pins VII. was forced by circumstances to enter into the concordat of Fontaineblean (1813), in which his right to the institution of bishops was in which his right to the institution of bishops was not recognised, but on the advice of his cardinals his acceptance of this treaty was speedily recalled. After the Restoration the king agreed to a new concordat with the pope (1817), superseding the agreement of 1801, and returning to that of 1516; but this 'ghost of the past' found little favour with the French people, and in 1826 was met by a solemn declaration of all the bishops that they still adhered to the propositions of 1682. In 1830 the relations of church and state were again revised. the relations of church and state were again revised, and the freedom of all confessions was declared. The constitution of 4th November 1848 guaranteed payment by the state to the clergy of all religions recognised by the state then or at a later time. Under the Second Empire the influence of Rome steadily increased, spite of the ambiguous attitude of the emperor.

Within the 19th century the opinions of the French clergy underwent a decided change. The Gallican doctrines were much less commonly held, and in a less extreme form, and fell into great discredit with the clurch party. The climax of this reaction was seen in the conduct of the French bishops at the Vatican Council (1869-70), in which a great body of them were foremost in renouncing the Gallican articles and accepting the doctrine of papal infallibility; and even those who, like Bishop Dupanloup of Orleans, contended for the opposite view, in the end acquiesced in the decision of the majority. In France at the present day the old theological divergences seem to have passed out of view in presence of the conflict between the

modern state and Ultramontanism,

modern state and Ultramontanism.

The chief authorities are Pithou, Les Libertés de l'Église Gallicane (1594, 2 vols. fol. 1639); Dupuy, Preuves des Libertés de l'Église Gallicane (1638); and Bossuet, Defensio Declarationis (Luxemburg, 2 vols. 1730; French trans. 2 vols. Paris, 1735). See also De Maistre, De l'Église Gallicane and Du Pape (2 vols. 1820); Dupin, Les Libertés de l'Église Gallicane (Paris, 1824; new ed 1860); Bordas-Demoulin, Les Pouvoirs Constitutifs de l'Église (1855); Huet, Le Gallicanisme, son passé, sa situation présente (1855); Puyol, Études sur la Renovation du Gallicanisme (2 vols. 1876); W. H. Jervis, History of the Church of France from the Concordat of Bologna, 1516 A.D., to the Revolution (2 vols. Lond. 1872), and its sequel, The Gallican Church and the Revolution (1882). the Revolution (1882).

Gallienus, Puri me Liervine Da-

The anthority of Gallienus was seren years later. limited almost entirely to Italy, for throughout the provinces the legions for the most part revolted, provinces the legions for the most part revolted, and raised their commanders to the dignity of Cassas. Hence the period is known in history as the Time of the Thirty Tyrants. In the East the honour of the Roman arms was maintained by Anrelian, Probus, and others, who found a useful ally in Odenathus, ruler of Palmyra, and his wife Zenobia, to whom Gallienns entrusted the care of the war against the Persians. In the West how zenoma, to whom Gamenns entrusted the care of the war against the Persians. In the West, how-ever, dangers thickened about him. Anreolus was proclaimed emperor by the legions of Illyricum, and, having marched into Italy, he seized Milan, and proceeded towards Rome. The war between the two was carried on for some time with undecided success, but Gallienus, while besieging his adversary in Mediolanum (Milan), was murdered by some of his officers, 268 A.D. He was succeeded by Clandius II.

Gallinaceous Birds (Lat. gallus, 'a cock'), or RASORES (Lat., 'scrapers'), an old order of hirds, including the Fowls, Sand-grouse, Henripods—e.g. Turnex, and often also the Pigeons. The title Galline is often still used to include the pheasant family (Phasianide), the grouse (Tetraonide), the sand-grouse (Pteroelide), the Turnicide, the mound-makers (Megapodiide), the trunicide, the mound-makers (Megapodiide), the curassows and guans (Craeide), the Tinamons (Tinamide), altogether over 400 species and about fourscore genera, and including forms of high antiquity. Interesting analogies have been pointed out between this order of high antiquity and was Market and the content of Turnicutes and the content of Turnicutes are the same of the same of Turnicutes are the same of Turnicutes are the same of the same of the same of Turnicutes are the same of the of birds and the order of Ruminants among Mamof brids and the order of fundiants among Man-mals, in the complexity of the digestive organs, bulkiness of the frame, low intelligence, easy domestication, usefulness to man, and prononcess to variation from the influence of external cir-cumstances, giving rise to different breeds. See POULTRY, GROUSE, PILEASANT.

Gallinule. Sec WATER-HEN.

Gallio, Junius Annaus, the Roman pro-consul of Achaia under Chandius when St Paul was at Corinth, 53 A.D. He was brother of the famous Seneea, and had procured his mame by adoption into the family of Gallio the rhetorician. Ho resigned the government of Achaia owing to illhealth, and later is said to have been put to death by Nero. The narrative in the Acts tells how, with regard to the clamonr of the Jews against Paul, he was 'not minded to be a judge of these matters,' and how 'Gallio cared for none of these things;' hence his name has become a synonym for a caroless, easy-going, and indifferent man who keeps himself free from trouble and responsi-

Galliot, a Dutch vessel carrying a main and a mizzen mast, and a large gaff-mainsail. Galliots — strong-built, flat-bottomed ships—of 400 to 500 tons burden, were formerly used also as bomb-vessels. The word is ultimately a diminutive of Low Lat. galea, 'a galley.

Gallip'oli (the Kallipolis of the Greeks), a town of Sonthern Italy, is built on a steep insulated rock in the Gulf of Taranto, connected with the mainland by a bridge, and is 59 miles by rail S. of Brindisi. The harbour is protected by a mole and fortified. The town contains a handsome cathedral, and is remarkable for its oil-tanks, excavated in the solid rock, in which olive-oil is deposited for exportation. Pop. 8083.

Gallipoli, a scaport of Turkey, on the peninsula of the same name (the ancient Threshop Co.

most important commercial town on the Hellespont, and still retains considerable trade. There are two harbours, extensive bazaars, and some manufactures. Gallipoli is the headquarters of the Turkish fleet, and the seat of a Greek hishon, and contains numerous mosques and fountains. The population is slightly over 15,000. The tawn was taken by the Turks in 1356, and formed their carliest European possession; and here the allies disembarked during the Crimean war.

Gallipot, the name given to a pot painted and glazed, commonly used for medicine. The word is a corruption of the Old Dutch glaypot, and already appears in Beaumont and Fleicher, glay being the same as the North Friesic glay, 'shining,' and cognate with Ger. glatt and Eng. glad.

Gallitzin. See Galitzin.

Gallium (sym. Ga, eq. 60°8) is a metal discovered by M. Lecoq de Boisbandran in 1875 in a zine-blende found in the Pyrenees. It has also been found in blendes from Asturia and from Bensherg Strange to say, its properties and its salts were predicted before its existence was known by Mendeleöff, in virtue of his Periodic Law (see Atomic Theory, Vol. I. p. 552). Callium is of a bluish-white colour, and has a specific gravity of 5°9. It possesses the remarkable property of fusing at 30°1° C. (76° F.), and remaining liquid when cooled down even to 0°. If, however, the globule of molten metal be touched with a fragment of solid gallium, it at once solidifies. Heated to bright reduces in contact with air gallium does not volatilise, and only a very thin coat of oxide formed on the surface. Gallium, which has ne industrial importance, dissolves readily in hydrochloric acid and in caustic potash with evolution of hydrogen. It forms one oxide, Ga₂O₃, which is insoluble in water, but soluble in potash and ammonia. The chloride, nitrate, and sulphate are all very soluble in water; the sulphate cembines with ammonium sulphate to ferm an alum.

Gallomania. See Anglomania.

Gallon, the standard unit of measure for liquids throughout the United Kingdom. It has existed as a measure from the earliest times, and in consequence has undergone many changes. The oldest exchequer standards preserved in the Standards Office include a Winchester corn gallon, of a capacity of 274‡ cubic inches, constructed by order of Hemy VII.; Queen Elizabeth added a standard ale gallon in 1601 of 282 cubic inches, and Queen Anne added in 1707 a standard wine gallon of 231 cubic inches. All these standard measures, however, were abolished in 1824, when the present imperial gallon, containing 10 lb. of distilled water, weighed in air (the barometer being at 30 inches, and the thermometer at 62° F.), was made the standard of capacity for liquid measures. This gives 277 274 cubic inches, and by subdivision or multiplication of this standard the other measures can easily be found. See Weights and Measures.

Gallotannic Acid, a synonym of Tannic Acid (q.v.). See also Gallic Acid.

Galloway, an extensive district in the senthwest of Scotland, once somewhat larger, but now entirely comprised in the shire of Wigtown and stewartry of Kirkeudbright. It enjoys a remarkably mild climate, and has long been fameus as a pastoral country, its breed of small horses and of large heruless black cattle home wall become diversity of scenery—nountain, lake, and stream, as well as dreary waste and almost pathless moor. There is no mineral wealth and hardly an industry, hence the inhabitants are almost entirely concerned with the primitive occupations of mantilling the soil, sleep and cattle rearing, and fishing. They are simple, honest, and hospitable, with almost every virtue proper to a peasantry save severe morality. A more detailed account of the country and its productions will be given under the heads Kirkcudentent and Wigtown.

The province owes its name to the fact that the natives were called Gall-Gael, or foreign Gaels, at first because of their falling under the foreign rule of the Anglians; but as the Picts of Galloway they continued to be known so late as the Battle of the Standard in 1138. Their geographical position had shut them off from their northern congeners, and they continued under their ancient names a distinct people till the 12th century, and preserved their language—which was substantially identical with Gaclie—till the 16th, when it finally disappeared before the Reformation and the use of Lowland Scotch in the parish churches and schools, leaving only a rich crop of place-names wonderfully similar to those of Ireland and the south-western Highlands of Scotland. The earliest inhabitants are styled by Ptolemy the Novanta, to the west of the Nith, Ptolemy the Novanta, to the west of the Nith, with two towns, Lucophibia at Whithorn and Rerigonium on the eastern shore of Loch Ryan; and the Scigova, covering Dumfriesshire, with the towns Trimontium, Uxellum, Corda, and Carbantorigum, the sites of which are placed by Mr Skene on Birrenswark Hill, on Wardlaw Hill, at Sanquhar, and at the moat of Urr, between Nith and Dec. Tacitus tells us that Agricola concentrated a force in that part of Britain which looks on Ireland, and most authorities identify this with Ireland, and most authorities identify this with Galloway rather than, as Mr Skene, with the modern county of Argyll. This view is horne out by the discovery of Roman forts in Wigtownshive and the Stewartry in situations corresponding with those of the towns of the Novanter described by Ptolemy as existing in the time of Hadrian. Galloway was subdued by the Northumbian Anglians of Bernicia during the 7th century, and governed by them fer about two hundred years, and it was to this period apparently that the modern name is due. After about three centuries of more or less complete independence, interrupted only by Norse ravages and at length by a period of Norse supremacy, it was recovered by Malcolm Canmere, granted as an carldom in 1107 to his youngest son David, and on his accession to the throne in 1124 formally united with Scotland.
Of the native lords of Galloway we read of a
doubtful 'Jacobus, rex Galwallin' as one of the eight tributary princes whe waited on Edgar at Chester in 973. A more historical figure is Fergus, appointed first Earl of Galloway, after the fall of Ulgrie and Duvenald, lords of the Galivenses, at the Battle of the Standard. With Semerled he under a market secretary largest against Makella III. made an unsuccessful revelt against Malcolm IV., and was obliged to give his lowship to his sons, Uchtred and Gilbert, whe in their turn, when William the Lion was taken prisoner at Almyick in 1174, attempted, but in vain, to throw off the Scottish yoke, even offering fealty te England. Roland, a sen of Uchtred, did homage to Henry II. of England, and his son Alan, who succeeds

Robert Bruce in his struggle with England for the Scottish crown. The province was traversed successively by Wallace, Edward I., and Bruce, and was at length subdued for his brother by Edward Bruce in 1308. Again in 1334 it was seized by Edward Baliol, but his power was at length overthrown, and in 1369 the eastern part of Galloway was granted by the crown to Archibald Donglas, surnamed the Grint, who built himself the stronghold of Threave Castle on a small island in the Dee. His hanghty and turbulent descendants built up a power so formidable as to threaten the crown itself, until they fell finally in 1455, when the lordship of Galloway was attached to the crown. These ages of troubles had generated a turbulent spirit among the Galwegians, and it was long before they settled down into peaceful and industrious citizens. They achieved a more honomable eminence by their devoted loyalty to the Covenant, which they had embraced with all their ancient ardour. Not all the infamous ernelties carried out at the bidding of a corrupt government by Timer, Grierson, and Claverhouse could crush the spirit of these 'wild western Whigs' whose martyr-graves are scattered over the moors of Galloway.

See Synson's Description of Galloway, 1684 (1823); Minray's Literary History of Galloway (1822); Mackenzie's History of Galloway (2 vols, Kirkc. 1841); Sir Andrew Agnew's History of the Hereditary Sheriffs of Galloway (1864); P. H. M'Kerlie's History of the Lands and their Owners in Galloway (5 vols, 1870-78); Sir Herbert E. Maxwell's Studies on the Topography of Galloway (1887); and C. I. Elton's article, 'The Picts of Galloway, in vol. i of the Archwological Review (1888).

Galloway, Mull of, a bold headland of precipitous rock, the sonthern extremity of the peninsula called the Rhinns of Galloway, in Wigtownshire, and the most sonthern point of Scotland. It is 1½ mile long, and ¼ of a mile broad, and rises to a height of 210 feet at its eastenn extremity, on which stands a lighthouse 60 feet high, whose intermittent light is visible at a distance of 23 nautical miles. The summit of the lighthouse commands a magnificent prospect of sea and sky, extending to the Isle of Man, 23 miles to the west, and sometimes even to the Cumbrian mountains, more than 50 miles distant. The Mull is part of the parish of Kirkmaiden, and is 5 miles from Drumore and 23 sonth of Stranraer.

Gallowglass, a heavy armed foot-soldier in the ancient Irish wars. They are grouped with kernes in Shakespeare's Macbeth (I. ii. 13) as coming from the western isles of Scotland. The word is of course Irish, formed from giolla, 'a man-servant,' and cognate with the well-known gillie.

Galls (when large, dry, and nnt-like often called Gall-Nuts, also Nut-galls and Oak-apples) are the abnormal vegetative growths produced in various plants through the introduction of the eggs, and the development of the larva of the various gallinsects. The economic usefulness and consequent commercial importance of so many of the larger forms, essentially due to the presence of a large quantity of tannic acid, will be noticed undor TANNING. See also Gall-Fly, Gallic Acid.

Gall-stone. See CALCULUS.

Gallus, C. Cornelius, a Roman noet, born at Forum Julii (mod. Frejus), in Gaul, about 66 B.C. He lived at Rome in intimate friendship with Virgil, Asinius Pollio, Varus, and Ovid, and was appointed by Augustus prefect of Egypt, but fell deservedly into disfavour and was banished, whereupon he ended his disgrace with his own sword about the year 26 B.C. Gallus was reckoned the founder of the Roman elegy, from his four books of elegies

npon his mistress Lycoris, of which but a few slight fragments have come down to us. His name was adopted by W. A. Becker as the title of his well-known picture of Roman domestic life: Gullus, Romische Szenen aus der Zeit Augusts (1838). See Völker, Commentatio de C. Gulli vita et scriptis (1840-44).

Gallus, Trebonianus, Roman emperor (251-253 a.D.), was the successor of the ill-fated Decins, and is memorable only from the dishonourable peace which he purchased from the Goths, followed by a dreadful pestilence in Italy. His end was to be nurdered by his own soldiers.

Galop, a lively kind of dance of German erigin, somewhat resembling a waltz, danced in ² time. See DANCING.

Galston, a village of Ayrshire, 5 miles SE, of Kilmarnock by rail, with manufactures of muslins and lace. There is coal in the neighbourhood. Pop. 4085.

Galt, a town of Canada, province of Ontario, stands on the Chand River, 25 miles by rail E. by N. of Hamilton. The environs of the town are noted for their beauty. The chief industries are the manufacture of flour, machines, cast-iron, paper, wooden ware, and leather. Call was founded in 1816. The inhabitants numbered 5187 in 1881, the majority being of Scotch descent.

Galt, John, Scotch novelist, was born at Irvine, in Ayrshire, May 2, 1779. His father, who was captain of a ship in the West Indian trade, left Ayrshire in 1780, and fixed his residence in Greeneck. In that town Galt received his education, and was then placed in the custom-house. He remained there till 1804, when, panting for literary distinction, he proceeded to London with an epic poem on the lattle of Largs in his portmantean. On reaching the metropolis he printed his cpic, but, becoming dissatisfied with its merits, ultimately withdrew it from the market. After a few years his health began to full, and he was obliged to seek relief in a more genial climate. At Gibraltar he made the acquaintance of Lord Hyron and his friend Hobhouse, and the three travellers became fellow-voyagers; but soon after Galt separated from his new friends to visit Sicily, then Malta, and finally Greece, where he again renewed his acquaintance with Byron, and had an interview with Ali Pacha. He next proceeded to Constantinople, and afterwards to the shores of the Black Sea. On one occusion when detained by quarantine he sketched six dramas which were afterwards given to the world. On his return he published with considerable success his Letters from the Levant, but first displayed distinct and individual power in The Ayrshire Legatres, which appeared in Blackwood's Magazine in 1820. Its successor, The Annals of the Parish (1821), unet with unquestionable success, and remains his masterpiece. Having hit on the true vein he worked it assiduously, and produced in quick succession Sir Andrew Wylie, The Entail, The Steamboat, and The Provost. He then diverged into the walk of historieal romance, and published Ringan Gibaics, a tale of the Covenanters; The Spacwife, Rothelan, and The Omen. These works, although full of striking scenes and really good writing, were not so successful as his carlier and less ambitious performances, Galt, whose hands were always equally full of literary and commercial undertakings, was now busily engaged in

He departed for Canada in 1826, but three years later returned to England a ruined man, and at once recommenced his literary labours with his

usual rapidity. His first novel was Lawrie Todd, which was followed by Southennan, a romance of the days of Queen Mary; and this by a Life of Lord Byron, which ran through several editions, but which was roughly handled by the critics. In 1834 three volumes. He now returned to Scotland, utterly broken in health and spirits, and after suffering several attacks of paralysis, died at Greenock, 11th April 1839.

Galt was a voluminous and unequal writer, but while some of his productions are already forgotten, others will perish only with the language. In depicting provincialism, in representing life as it flows on in small towns and villages—communities in which the successful shopkeeper may aspire to be the chief magistrate, and in which the minister is the emer magistrate, and in which the minister is the most important personage—he is without a rival. He possesses rich humour, gennine pathos, and a rare mastery of the Scotch dialect.—His son, Sir ALEXANDER TILLOCH GALT, born at Chelsea, 6th September 1817, was elected to the Canadian parliament in 1849, and was finance minister in 1858-62 and 1864-66. In 1880-83 he was High Commissioner for Canada in Britain and he served Commissioner for Canada in Britain; and he served on the Washington Treaty and Halifax Fisheries Commissions. He is a G.C.M.G.

Galton, Francis, F.R.S., grandson of Dr Erasums Darwin, and cousin of Charles Darwin, was born at Duddeston in 1822, and educated at King Edward's School, Birmingham. He studied rang Edward's School, Briningham. He Shitted medicine at the Birmingham Hospital and King's College, London, and graduated from Trinity College, Cambridge, in 1844. Having in 1846 travelled in North Africa, he explored in 1850 travelled in North Africa, he explored in 1850 lands hitherto unknown in South Africa, publishing his experiences in his Narrative of an Explorer in Tropical South Africa, which obtained the gold medal of the Royal Geographical Society, and in Art of Travel, which passed through five editions between 1855 and 1872. His investigations in meteorology are recorded in Meteorographica, published in 1863. A member of a Meteorological Committee of the Board of Trade, he was appropriated one of the countries on travel with the appointed one of the committee entrusted with the appointed one of the committee entrusted with the parliamentary grant for the Meteorological Office. Latterly be has specially devoted himself to the problem of heredity, publishing Hereditary Genius: its Laws and Consequences (1869); Experiments in Punganesis (1871); English Men of Science: their Nature and Nurture (1874); Life-history Album (1884); Natural Inheritance (1889), &c. He was general socretary of the British Association, 1863-68; President of the Anthropological Soctions, 1877 and 1885: President of the Anthropological Instiand 1885; President of the Anthropological Institute. 1885-86.

Galvani, Luki, a famons anatomist, was born at Bologna, 9th September 1737, studied theology and subsequently medicine at the university there, and in 1762 was elected professor of Anatomy. lectures enjoyed much popularity, and among other writings two treatises on the organs of hearing and on the genito-urinary tract in birds added consideron the genito-inneary tract in birds added considerably to his reputation. But Galvani owes the wide eclebrity attached to his name to his discoveries in animal electricity. The story of the convulsive muscular movements produced in a skinned frog by a chance contact with a scalpel may be dismissed as unfounded; there is evidence that Galvani's views were based on experiments patiently conducted for many years before the publication of his ducted for many years before the publication of his De viribus Electricitatis in Motu Musculari Commen turius (1991). He was removed for a time from his post because of his refusal to take the oaths prescribed by the Cisalpine Republic, of which Bologna then formed a part; but he was afterwards reinstated, and died 4th December 1798, in Bologna,

where his statue was erected in 1879. his writings were published in a quarto edition in 1841-42 by the Academy of Sciences of his native city; but several manuscript treatises by him were

discovered there in April 1889.

GALVANISM is one of the names of a particular branch of the science of electricity, given in honour of Luigi Galvani, from whose observations and experiments the historical development of current electricity dates. The term itself is rarely used now; and the subject will be found treated under Electricity. Thore are, however, other expressions which have been derived from the same source, and which are in common use. Such are galvanic entrent, galvanic cell, galvanic battery, and galvanometer. Voltaic may be, and very often is, used in place of galvanic in the first three expressions; but galvanometer is the one name for an instrument which measures the strength of an cleetric current by means of its effect upon a noighbouring magnet. The gradual disuse of the term galvanism is probably due to the recognition in these later times of the fact that, although Galvani's experiments were the beginning of the new era in electricity, it is to Volta that we are specially indebted for the development of the science along purely physical lines.

Galvanised Iron. This name is given to iron which has been coated with zine to prevent its rust which has been eather with zine to prevent its risring. The iron is simply dipped in the melted zine, and the name does not imply, as might be supposed, that any definite galvanic process is undergone. Galvanised iron first came into use about 1837, when iron cooking-vessels were treated in this way. Since that timed iron has come into weather each interest and galvanhas come into use for cooking vessels, and galvanised iron is now employed chiefly for roofing puriod to be poses, linekets, telegraph wire, chains, &c. The process of manufacture is very simple. The zinc is process of manufacture is very simple. melted, and dry sal-anmoniae poured on the top.
This fuses and forms a protecting layer, keeping
the surface of the metal clean. The iron plates or vessels, having been carefully cleansed by means of dilute hydrochloric acid and scrubbing with sand, are now introduced into the molten zinc, which immediately forms an alloy with the iron, and renders it incapable of rusting. Care must be taken not to immerse the iron for too long a time, for the alloy of zine and iron melts at a comparatively low temperature, and there is a danger of destroying the vessel which is being galvanised. Galvanised iron is not so tough as iron itself, but still the freedom from rusting makes it specially applicable for many purposes. Galvanised iron water-pipes are now much employed in houses, but steam-pipes of this material are misatisfactory: when exposed continuously to a moist steam heat, galvanised iron seems to become corrolled, and small holes make their appearance. Galvanised iron is, of course, unsuitable where any acid is present, and any pre-paration containing vinegar will assume a disagree-able tasto if placed in a galvanised vessol.

Galveston, a seaport of Texas, and the largest city of the state, is situated on Galveston Island, at the opening of the bay of the same name into the Gulf of Mexico, 214 miles ESE, of Austin by rail. The island is a low strip of land, some 30 miles long by 3 broad; the bay extends northward from the city to the month of the Trinity River, a distance of 35 miles, and has a breadth of from 12 to 18 miles. The city contains a Catholic cathedral, the Catholic University of St Mary, and the Texas Medical College; and it has several foundries, flour and planing mills, and machino-shops. Its harbour is the best in the state, protected since 1887 by a breakwater; and steamers make regular passages to New Orleans and the Gulf ports, Havana, New York, and Liverpool. Cotton and cotton-seed oil form the great bulk of the foreign exports, and in 1887 exceeded \$17,000,000; the foreign imports in the same year reached \$1,765,612, while the trade with the other states of the Union aggregated \$110,000,000 (imports, \$80,000,000; exports, \$30,000,000). Pop. (1850) 4177; (1870) 13,818; (1880) 22,248; estimated in 1889 at 50,000.

Galway, a maritime county of Ireland, in the province of Connaught, and, after Cork, the largest of all the Irish counties. Area, 1,569,505 acres, of which a little more than one-half is arable. Pop. (1831) 414,684; (1871) 248,458; (1881) 241,662, whom 234,183 were Roman Catholics. watered in the east by the Shannon, the Suck, and their feeders; and in the west by Longhs Mask and Corrib, and by the streams which fall into these loughs and into Galway Bay. In the south are the Slieve-Banghta Monntains; and in the west are the Maani-Turk Mountains, and the well-known Twelve Pins, a striking mountain group, culminating in Benbaun (2395 feet). This western portion of the county is wild and romantic; the hills are separated by picturesque glens, and by secluded and beautiful longhs. South west from Lough Corrib to the sea is the district called Conne-Lough Corrib to the sea is the district called Connemara, which contains vast bogs, moors, lakes, and morasses, and presents a peculiarly bleak and dreary aspect. North-east of Connemara is Joyce's Country, and south-east of it is Iar-Connaught, or Western Connaught. The shore is much broken, offering many hays that serve as harbours for large vessels, and is fringed with numerous islands. The climate is mild and humid, but in low-lying localities is sometimes unhealthy. The richest soil occurs in the district between the head of Galway Bay and the Shannon. Agriculture and ishing are the most general pursuits. The lakes and loughs, as well as the coasts of Galway, are well stocked with fish. The county abounds in ancient remains of the Celtic as well as of the English period. Raths and croulechs are numerous; there are seven round towers; whilst of many monastic ruins the finest is that of Knockmoy, near Tuam. Since 1885 Galway county has returned four members to parliament.

GALWAY BAY is an inlet of the Atlantic Ocean, on the west coast of Ireland, between the counties of Column and Clara. It is a public short of water

GALWAY BAY is an inlet of the Atlantic Ocean, on the west coast of Ireland, between the counties of Galway and Clarc. It is a noble slicet of water, and offers great facilities for an extended commerce—being 30 miles in length from west to east, with an average breadth of about 10 miles, and is

sheltered by the Arran Isles.

Galway, a municipal and parliamentary borough of Ireland, a scaport, and county of itself, stands at the mouth of the river Corrib, on the north shore of Galway Bay, 50 miles NNW. of Lineriek, and 127 W. of Dublin by rail. The old town of Galway is poorly built and irregular. In the wall of a house here is the 'Lynch Stone,' bearing a skull and crossbones, and commemorating a mayor of Galway, James Lynch Fitzstephen, commonly called 'Mayor Lynch,' who, in 1493, like Brutus of old, condemned his own son to death for the nurder of a Spaniard, and to prevent his being rescued, actually caused him to be hanged from a window of the old prison on that site. Hence some have derived Lynch Law (q.v.). The new town consists of well-planned and spacious streets, and is built on a rising-ground which slopes gradually toward the sea and the river. A suburb, called Claddagh, is inhabited by fishermen, who exclude all strangers from their society. Galway is the see of a Catholic bishop, but is in the Protestant Episcopal diocese of Tuam. The principal buildings are the cruciform church (Episcopal) of St Nicholas (1320), St Augustine'e

Catholic Church (1859), monasteries, numeries, the county court-house, barracks, prison, infirmary, &c. Queen's College (1849) has eighteen professors and about a hundred students; its quadrangular buildings are spacious and handsome. Galway has flour-mills, a distillery, a foundry, extensive salmon and sea fishing, a good harbour, with docks that admit vessels of 500 tons, and a lighthouse. During 1858-64 a line of steamers plied between Galway and the United States. The exports consist mainly of agricultural produce, wool, and black marble. Galway returns one member to parliament. Pop. (1851) 20,686; (1881) 15,471, of whom nine-tenths are Catholics.

Galway was taken by Richard de Burgh in 1232, and the ancestors of many of the leading families now resident in this quarter settled here about that time. From the 13th till the middle of the 17th century the place continued to rise in commercial importance. In 1652 it was taken by Sir Charles Coote after a blockade of several moulds; and in July 1691 it was compelled to surrender to General Ginkell. See Hardiman's History of the Town and County of Galway (Dublin, 1820).

Gama, Vasco da, the greatest of Portuguese navigators, was born about 1469, of good family, at Sines, a small seaport in the province of Alemtejo. He early distinguished himself as an intrepid mariner, and, after the return of Bartolomen Diaz in 1487 from his venturesome voyage past the Cape of Storms had determined King João to make explorations farther, was appointed by his successor, Manoel the Fortunate, to command an expedition of four vessels, manned with 160 men. At the same time he was furnished with letters to all the potentates he was likely to visit, among them the mythical 'Prester John,' then supposed to be reigning in splendour somewhere in the east of Africa. The little flect left Lisbon 8th July 1497, but was vexed by tempestuous winds almost the whole way, and was four months in reaching St Helena Bay. After rounding the Cape, in spite of dreadful storms and mutinies among his crews, he made Melinda early in the following year. Here he found a skilful Indian Pilot, next steered eastwards across the Indian Ocean, and arrived at Calicut, in India, on the 20th of May 1498. The zamorin or ruler of Calicut was at first merely suspicious, but soon became, at the instigation of the jectous Arab merchants, actively hostile, until at length Da Gama had to light his way out of the harbour. In September 1409 he cast anchor at Lisbon, and was received with great distinction, and created a noble.

King Manoel immediately despatched a squadron of thirteen ships, under Pedro Alvarez Cabral, to establish Portuguese settlements in India. Sailing too far westwards he discovered the unknown coast of Brazil, and, after losing half his ships, at length made Calient, where he founded a factory. Here, after Cabral's departure, the forty Portuguese who had been loft behind were murdered by the natives. To avenge this insult and secure the Indian Ocean commerce the king fitted out a new squadron of twenty ships, which set sail under Da Gama's command in 1502, founded the Portuguese colonies of Mazambique and Sofala, bombarded Calient, destroyed a fleet of twenty-nine ships, and extorted a peace with suitable indemnification, and reached the Tagus with thirteen richly-laden vessels before the close of December 1503. Da Gama had effected his purpose with marvellous despatch, but not without cruelties that have left an indelible stain upon his name. For the next twenty years he lived inactive at Evora, while the Portuguese conquests in India increased, presided over by five successive viceroys. The fifth of these was so

unfortunate that King João III., the successor of Manoel, was compelled in 1524 to summon Da Gama from his seclusion and despatch him, with the title of viceroy and a fleet of thirteen or fourteen vessels, to the scene of his former triumphs. His firmness and conrage succeeded in making Portagal once more respected in India, but while engaged in his successful schemes he was surprised by death at Cochin in December 1525. His body was conveyed to Portagal, and huried with great pomp at Vidigueira. The great achievement of Vasco da Gama is one of the most important points in the history of modern civilisation, second only in importance to the discovery of America by Columbus but a few years before. His story gave tis impulse to the enthusiasm of Camoens, whose Lusiads would alone have given the subject immortality. See the Three Voyages of Vasco da Gumu, trans. by Lord Stanley of Alderley for the Hakluyt Society (1869).

Gama'iel (Gamli'el, 'my rewarder is God'), a Hebrew name, the most celebrated hearer of which is Gamaliel I., or the Elder (so called to distinguish him from his grandson), probably the one mentioned in the New Testament, at whose feet St Paul learned the 'law.' Both here and in the Talmudical writings he appears only in his capacity of a teacher of the law and a prominent Pharisaic member of the Sanhedrim; of the circumstances of his life we know little but that he tanght early in the 1st century, and that he interposed on behalf of the apostles of Christianity. He was the son of Simcon, and grandson of Hillel (q.v.). Laws respecting the treatment of the Gentiles, due directly or indirectly to Gamaliel's influence, show unusual breadth and toleration. The Gentile, it was cuacted, should henceforth, like the Jew, be allowed tho gleanings of the harvest-field; of his poor the same care was to be taken, his sick were to be tended exactly as if they belonged to the Jewish community. Tolerant, peaceful, as free from fanalicism on the one hand as on the other from partiality for the new sect, he seems to have placed Christianity simply on a par with the many other sects that sprang up in those days and disappeared as quickly; and he exhorts to long-suffering and good-will on all sides. When Gamalied died (about seventeen years before the destruction of the Temple) 'the glory of the law' was said to have departed. The story of his conversion to Christianity, we need scareely add, is as devoid of any historical foundation as that of the transmission of his bones to Pisa. Yet his name has been placed on the list of Christian saints, his day being the 3d of August.

Gamba. See VIOL DI GAMBA.

Gambetta, Léon Michel, French statesman, was born at Cahors, of Gonocse-Jewish extraction, October 30, 1838. After studying law, he became a member of the Paris bar in 1859. He soon attracted attention by his advanced liberal views, and in 1868 acquired still greater celebrity by his striking speech in the Baudin case, and his denunciations of the arbitrary measures of Louis Napoleon. In 1869 he was elected deputy by the Irreconcilables for both Marseilles and Belleville, and took his seat for the former constituency. Early in the session of 1870 he protested against the imprisonment of his friend Rochefort, attacked the ministry of Emile Ollivier, and predicted the approaching advent of the Republic. Upon the surrender of Napoleon III. at Sedan, Gambetta proposed the deposition of the imperial dynasty, and he was one of the proclaimers of the Republic, September 4. On the 5th he became minister of the Interior in the Government of National

Defence, and at once took vigorous measures for opposing the Germans and defending Paris. The capital, however, was invested, and in October he escaped in a balloon in order to join his colleagues at Tours. Here, and subsequently at Bordeaux, he assumed the general conduct of public atlairs, and for five months was Dictator of France. With marvellous energy and undaunted courage he called army after army into being, and sent them against the German hosts, but in vain. The trumpet tones of his appeals were heard throughout the whole of France, and at one moment it seemed as though success must attend the efforts of the indefatigable minister; but the surrender of Metz by Bazaine—which Cambetta denounced as an act of treason—crushed all hopes of deliverance for France. Nevertheless, Cambetta continued the struggle, and even when Paris succumbed to the invaders he demanded that the war should be carried on a Voutrance, and that an assembly should be elected for that purpose. When his colleagues in the capital had concluded an armistice, and called upon the electors without regard to party to elect a constituent assembly, Gambetta issued a decree at Bordoaux, Jamary 31, 1871, disfranchising all functionaries of the Empire and all mombers of royal dynastics. This decree was repudiated by the government at Paris, whereupon Gambetta resigned, and for some mouths retired into Spain. But he became more popular than over with the masses, and was elected to the National Assembly by ten departments. He took no part in the earlier sittings of the Assembly or in the suppression of the Commune. In July he was re-elected for the departments of the Scine, Var, and Bonchesdu-Rhône, and took his seat for the last-named department. The République Française appeared in November 1871 as his representative organ.

GAMBETTA

masses, and was elected to the National Assembly by ten departments. He took no part in the earlier sittings of the Assembly or in the suppression of the Commune. In July he was re-elected for the departments of the Scine, Var, and Bonchesdu-Rhône, and took his seat for the last-named department. The République Française appeared in November 1871 as his representative organ.

The second part of Gambetta's political career began after the fall of the Commune, when he was accepted as the chief of the advanced Republicans. Early in 1872 he traversed the south of France, exciting the enthusiasm of the populace, and in the cusning September he formulated the Republican programme at Grenoble, severely attacking M. Thiers and the National Assembly, and demanding the removal of the government from Versailles to Paris. He had now become the most prominent Frenchman of the time. The National Assembly voted the republicans from the attacks of the Irreconcilables. The 'fon furrieux' of M. Thiers now developed into the leading exponent of Opportunism. He opposed the vote of the Assembly establishing serutin d'arrondissement, and after the elections of 1876 became president of the budget committee. A constitutional conflict arose in May 1877, when the Duc de Broglie took office in the lone of restoring the monarchy. A civil war seemed imminent, but, owing chiefly to the zeal and activity of Gambetta, such a catastrophe was averted, and the Republic firmly established. The chamber censured the ministry by 363 to 158 votes, and a dissolution was ordered. Gambetta exclaimed, 'We go out 363, and 363 we shall return,' and his prophecy was fulfilled to the letter. Marshal MacMahon refrained from pushing matters to an extremity, and the royalist contest was abandoned. Gambetta was summoned before the Eleventh Correctional Tribunal of Paris for having declared respecting MacMahon at Lille, 'H faudra ou se soumettre, ou se démettre.' He was condemned on October 24 to three months' imprisonment and a fine of 4000 francs.

contest between the deputy and the president ended in the triumph of Gambetta—who did not go to prison—and the resignation of MacMahon. M. Grevy was elected president, but Gambetta was regarded as the saviour of the Republic. Though now the most powerful statesman in France, and the maker and unmaker of cabinets, he declined to take office, on the ground that no strong government was possible until the cleetive scrutin de liste had been adopted. In 1878 Gambetta fought a duel with M. de Fourton, an ex-minister, whom he had charged with falsehood, but the hostile encounter had a harmless termination. Shortly afterwards Gambetta accepted the presidency of the chamber, a post which he held till the autumn of 1880. In November of that year the Ferry ministry resigned, being discredited by the mismanagement of the Tunis expedition. Gambetta was called upon to form a cabinet, and succeeded, after much difficulty. But, as it was practically a government of one, opposition to the new premier set in, and when he produced his scheme for the revision of the constitution in January 1882 the chamber rejected the scrutin de liste proposal by 305 to 110 votes, and Gambetta immediately resigned. He afterwards acted as chairman of the military committee, but took little part otherwise in public affairs.

On 26th November, as he was handling a tevolver at his residence at Ville d'Avray, the weapon accidentally went off, and the bullet entered the palm of his hand and came out at the wrist. A report subsequently prevalent asserted that the wound was inflicted by a woman's hand. In any case, no serious consequences were apprehended, and in spite of sinister rumours he was reported convalescent on 13th December. The wound, however, took an unfavourable turn; internal inflammation set in, and the patient suffered terrible agony. Yet he was conscious and self-possessed until the end, and expired on the last day of the year 1882, being only forty-four years of age. He was buried at Nice, France mourning for him as one of the greatest of her patriots and sons, and as one who, hy his dauntless will, energy, and cloquence, had indelibly impressed himself upon one of the darkest periods of her national history. Reinach has edited his Discours Politiques (10 vols. 1880-84), and written a Life of him (1884).

Gambia, a river of Western Africa, the more southerly of the two great streams of Senegambia, enters the Atlantic after a course estimated at over 1400 miles, by an estuary which in some parts measures nearly 27 miles across, but contracts to little more than 2 at the mouth (Bathurst, 13° 24' N. lat., 16° 36' W. long.). It is navigable from June to November for vessels of 150 tons up to Barraconda, about 400 miles from the sea. The whole of the lower river, extending to Georgetown, 180 miles from Bathurst, is British waters. Below Barraconda the river overflows its banks in the rainy season, and, like the Nile, leaves a fertile deposit of mud.—The British settlement of Gambia occupies the banks of the river as far up as Georgetown, though not continuously. Its actual area is about 69 sq. m., embracing St Mary's Island, a sandbank about 3½ miles long by 1½ hroad, mostly covered with low swamps, but containing Bathurst (q.v.); British Combo, on the mainland opposite; Albrida, on the north bank; the Ceded Mile; and M'Carthy's Island, with Georgetown. The climate is officially described as only 'fairly healthy during the dry months.' Besides the weaving of cotton into native cloths, there are manufactures of vegetable oils and bricks, and some boat-building. The staple product is the ground-nut, which is exported to the south of Europe for the extraction of oil, although this trade has

declined since 1858. Other products are hides, rice, cotton, becswax, kola nuts, and india-rubber, and there is an active entrepôt trade with the neighbouring French settlements in cotton goods, spirits, rice, kola nuts, and hardware. In the ten years 1878-87 the imports (mostly British) ranged from £217,938 in 1884 to £69,243 in 1886; the experts (chiefly to France) from £254,711 in 1882 to £79,516 in 1886. The revenue in the same period ranged from £28,952 to £13,453, but the expenditure never fell below £18,361. Formerly a dependency of Sierra Leone, the settlement was created an independent colony in 1843, and became a portion of the West African Settlements in 1876; in 1888 it was made a separate government. The settlement is connected with Europe by telegraph cables, and the Liverpool mail-steamers call fortnightly. There are 14 denominational schools (8 Mohammedan), receiving grants in aid, with about 1300 pupils. Pop. (1881) 14,150, including some 25 Europeans.

Gambier, Gambir, or Pale Catechu, is an important article of commerce, used to a small extent medicinally as an astringent, but very largely in tanning and dyeing. It is an earthy-looking, light-brown substance, often in small cubes or in compact masses. It possesses no oddur, but has a bitter, astringent taste, subsequently becoming sweetish. Under the microscope it is seen to consist of small accular crystals. It is prepared in a very rude manner from the yeang leaves of the Uncaria Gambir, a native of the countries bordering the Straits of Malacca. As the plant, which grows to 8 or 10 feet, constantly produces young leaves, the manufacture is carried on throughout the year. The leaves are boiled in water, squeezed, and the decoction evaporated to a thick consistence, when it is poured into backets, and treated in a curious manner. The workman takes a stick, which is moved up and down in the mass, and, as the gambier dries on it, it is scraped off and allowed to harden. It is asserted that stirring the mass does not produce an equally good article.

Gambier, James, Baron, Admiral, was born in the Bahamas, 13th October 1750, entored the navy, and off Ushant fought with distinction as commander of the Defence under Lord Howe in 1794. As admiral he commanded the British fleet at the bombardment of Copenhagen in 1807, and was rewarded with a peerage. At the battle of Aix Roads in 1800 he refused to act on the advice of Lord Cochrane (see Dundonald), was tried by court-martial, and 'most honomably acquitted.' He attained the high rank of Admiral of the Fleet in 1830, and died 19th April 1833. The Memorials of him (1861) by Lady Chatterton has no value.

Gambier Islands, or Mangareva, a Polynesian group of six larger and several smaller islands, under a French protectorate, in 23° 8′ S. lat. and 134° 55′ W. long. Area, 15 sq. m. The pop., under 1000, are Catholics. Poarls and mother-of-pearl are the chief exports.

Gambit. See CHESS.

Gambling, or GAMING, may be defined as the practice of playing fer a money stake games depending solely on chance, like routette, for instance, or those other games into which the element of skill enters, as in the cases of whist or billiards. Gambling was not countenanced by the Roman law; but a curious exception seems to have been made when, by the terms of the wager, the loser had to provide refreshment or hospitality for the winner. Before the passing of an enactment for the restriction of games and gaming, all games like eards and dice, and all exercises, were legal at common law so long as they were indulged in for recreation and played fairly and without

cheating; and the reason assigned for the favour which gambling finds with the majority inaptly stated by a writer in the time of Queen Anne. He says: 'I cannot attribute it to a principle of more avaries in many, though in most I fear it is so, but rather think the contingency of winning and losing and the expectations therefrom are diverting. I conceive there would be no pleasure properly so called if a man were sure to win always. It's the reconciling uncertainty to any desires that creates the satisfaction.' Among the old writers the subject of gaming appears to have taken a wide scope, and to have been mixed up with games which might more properly be ranked under the head of athletic excreises, as well as with what our ancestors were pleased to regard as sport; and the same classification appears to have taken place in some of the older statutes. Statutory restrictions upon games and gaming go back as far as the 12th year of the reign of Richard II., and these were followed by the 17th of Edward IV. and others which made certain games illegal; but in giving an outline of the chief statutes connected with gaming it is unnecessary to go further back than the year 1541, as the comprehensive Act 33 Henry VIII. chap. 9 prohibited tables, tennis, dice, cards, bowls, dash, loggats, and other unlawful games when played under certain conditions. This statute, however, like one of Edward III.'s proclamations, had for its immediate object the encouragement of archery, and professes to have become law in consequence of a petition being presented by the bownen of this country and those engaged in the manufacture of implements of archery.

For some time there was no material alteration for some time there was no material attention in the laws affecting gaming; but Charles II. desiring to prevent his subjects from becoming 'lewd and dissolute,' an act was passed (16 Car. II. chap. 7) to put down 'deceitful, disorderly, and excessive gaming.' The statute enacted that all persons winning by fraud over certain games and approximate therein specified were to fafait trails the value of their winnings; that every one losing more than £100 on credit at the games before mentioned was to be discharged from the obligation to pay it; that all securities given for the debt were to be void; and that the winner was to forfeit treble the sum he won in excess of £100. This act of Charles II.'s is said to have been passed in consequence of the vast sums of money won and lost over a match on the turf in which two horses belonging to Mr Tregonwell Frampton and Sir Charles Strickland respectively were the Before the match came off Frampcompetitors. ton's trainer meeting Hesletine, who had charge of Sir C. Strickland's horse, proposed to run a private trial, and at Sir Charles's directions Hesletine assented. Each jockey at the instigation of his master carried 7 lb. more than the specified weight under the idea that he had stelen a march on his opponent. Frumpton's horse won the trial after a close race, and his party argued that as he won with the worst of the weights he would achieve an easy victory at even weights. The other side an easy victory at even weights. The other side argued that, as their horse was beaten so little when handicapped with an extra 7 lb., he would turn the tables in the race, which, however, ended as the trial had dene. So much more changed hands that, as already mentioned, the above act was passed. Passing over for the present the staintes aimed at unlawful games, it is sufficient to notice that by the first licensing act (25 Geo. H. chan 26) capting house are fashiolden. chap. 36) gaming-houses are forbidden; but during the long reign of George III. the government dees not appear to have troubled itself much about gaming and gamesters, and we may pass on to the 8 and 9 Vict. chap. 109, the 18th section of which renders

void all contracts by way of gaming and wagering. The 16th and 17th Vict. put down betting houses; and the 31st and 32d Vict. chap. 52 (the Vagrant Act) cnacts that every person betting, wagering or gaming in any open or public place with any table or instrument of gaming shall be deemed a rogue or instrument or gaming shall be deemed a vogue and vagabond, and, upon conviction, shall be punished as the act directs. It was under this act that the proprietors of the 'Pari-nutuel' were punished (see Betting). In spite of the statutes forbidding gaming-houses they have been carried on, and during the year 1889, besides several other cases the relice washer will, when the Field Child. cases, the police made raids upon the Field Club, in Park Place, St James's, and another in Maideu Lane, Strand, the proprietors of which were fined £500 each, substantial penaltics being also inflicted

npon some of the officials.

It has been mentioned above that the statute of Henry VIII. made certain games illegal; and so long ago as the time of Edward IV. certain other games, like 'Holy Bowls,' were unlawful. In 1618, however, James I. made a declaration that the dancing of men and women, leaping, May games, and some other forms of anniscinent should be permitted, and Charles I. allowed feasts of dedications of churches, called wakes, to be indulged in; but the 18th Geo. If. chap. 34 put a stop to Roulet, or Roly-paly, a game which could have no connection with modern roulette, because the act speaks of Roulet 'or any other game with cards or dice.' It will be noticed that the statute passed in the time of Henry VIII, was not repeated at the time Queen Victoria came to the throne, and it was not until the year 1845 that bowls, quoits, tennis, and many other games of skill could legally be played in any public alley or ground. In 1845, however, it appears to have struck the ruling powers that it was a little incongruous to retain in the statute-book an act which both prohibited games of skill, and ordered people to shoot with bows and arrows. so in that year the 8th and 9th Vict. chap. 109 was passed, and a great deal of the act of Henry VIII. passed, and a great deal of the act of Henry VIII, was repealed; and, to sum up, it may be pointed out that racing of all kinds, what are known as athletic sports, all games like cricket, croquet, quoits, &c., all of what are known as 'parlour pastimes,' and most games at eards are now legal. The exceptions are Acc of Hearts, Bassett, Dice (except Backgammon), Hazard, Pharach (or Faro), Passage, Roly-poly. It will be observed that neither playing cards for money uar betting are illegal per se; they only become so when indulged in under certain canditions. There is nothing unin under ecrtain conditions. There is nothing unlawful in playing cards in a private house, or whist in a club; but to frequent a gaming house is not allowed. Again, a man does not break the law because he makes a bet on eredit in his house, on a racecourse, or at Tattersall's if he is taken to be a member; but should be stake his money and make his bet at the bar of a public-house or on the street he renders himself liable to be proceeded against.

Lotteries, which are first heard of in England in 1569, were for some time legal, and at last so many private and cheating ones became mixed up with the more honourable affairs that legislation became necessary, and the 10th and 11th William III. chap. 17 was passed for the purpose of suppressing them by declaring them public musances; though there was still a loophole, for lotteries might be carried on 'under colour of patents or grants undor the great scal.' This act, however, did little or nothing to check the evil, nor do subsequent enachments appear to have been more efficacious. State lotteries were altogether put an end to in 1826, from which year we hear very little of lotteries, as the laws against them are now strictly enforced. Raffles and sweeps are illegal, being nothing more than lotteries; yet every club

has its Derby sweep; and when Convocation met in the summer of 1889, and denounced the tendency of all classes towards indulging in betting and gaming, one or two of the speakers spoke in extenuation of lotteries and raffles at fancy fairs organised for charitable or religions objects. Art unions are specially exempted from the operation of the statutes against lotteries by the 9th and 10th Viet. chap. 48, which declares that voluntary assovice chap 45, which declares that volutions for acquiring works of art which are afterwards distributed by let are to be deemed legal after a royal charter has been obtained. Cambling which takes the form of speculating in stocks and shares has long been common, but at present a certain number of outside brokers—men, that is to say, who are not members of the Stock Exchange —arc offering every facility to those desirons of indulging in the hazardons pastime. By staking with the broker one per cent. of the amount it is determined to nominally expend, the investor can give his orders. Thus, in the words of the advertisements, £5 (called 'cover') commands £500 of stock. Should the stock full sufficiently to exhaust the cover, the transaction is at an end; the investor loses his cover, which goes into the pocket of the broker. If the stock rises in the market the investor can claim the difference between its present value and the price at which he bought, or nominally bought, for no stock changes hands in these transactions. No brokerage is charged, and, as palatial offices are occupied, it would appear that a very great majority of speculators lose their money. This system when analysed is neither more nor less than betting upon the rise and fall, the broker being

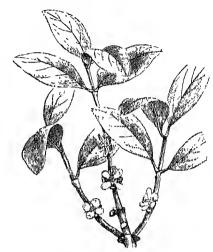
to all intents and purposes a hookmaker.

In the United States, keeping a gambling-house is indictable at common law as injurious to morals; and most states and territories have passed laws against gambling, in some of them severe and stringent. Yet till 1880 gambling was exceedingly common and open throughout the United States; prosecutions were few and fines often merely nominal; and it was left to societies for the suppression of vice and cognate institutions, especially in New York, to stir up the authorities to put the laws in force. In 1881–84 prosecutions and convictions were very numerous; in 1885 almost all the chief cities in the Union followed with success the example of New York in putting down gambling as far as possible.

See BETTING, MONACO, BADEN-BADEN, and articles on the various games; also Frederick Brandt, Games, Gaming, and Gamester's Law (new ed. 1873); an article in the Quarterly for January 1889; and a bibliography of books on gambling in Notes and Queries (1889).

Gamboge, or Camboge, a guni-resin, used in medicine and the arts, the produce chiefly of Garcinia Morella (Gambogia gutta or Hebradendron gambogioides), a tree of the order Guttiferre (suborder Clusiaceæ), a native of Cambodia (hence the name), Ceylon, Siam, &c. The gamboge-tree attains a height of 40 feet, has smooth oval leaves, small polygamous flowers, and clusters of sweet and edible fruits. When the bark of the tree is wounded the gamboge exudes as a thick, viseid, yellow juice, which hardens by exposure to the air. It is generally collected in a joint of bamboo, and a single tree will yield sufficient to fill three joints 20 inches in length and 1½ inch in diameter. From this cause it is found in commerce in the form of sticks or cylinders having the markings of the bamboo on the ontside. When of good quality it is of a rich, orange-brown tint, and should not show a rough granular surface when broken. Since yellow is a colour sacred to Buddha, gamboge is in much request in Singhalese temples, alike for vestments and decorations. The finest gamboge comes from Siam.—American gamboge, which is very similar.

and is used for the same purposes, is obtained from Vismia guiancusis, and other species, shrubs of the order Hypericinæ. Camboge occurs in commerce



Gamboge (Garcinia Morella).

in three forms: (1) in rolls or solid cylinders; (2) in pipes or hollow cylinders; and (3) in cakes or amorphous masses. The first two kinds are the purest. Good gamboge contains about 70 per cent. of resin and 20 per cent. of gum, the remainder being made up of woody fibro, feedla, and moisture. Medicinally it acts as a violent purgative, seldom administered alone. It is employed in water-colour painting, in the staining of wood, and in the formation of a golden hacquer for brass. It can be readily bruised, forming a brilliant yellow, slightly incdorous powder, and possesses a disagreeable acrid taste.

Gambrinus, a mythical king of Flanders, to whom is ascribed the invention of hoer. His ligure is familiar in German beer-cellars, often seated astride a cask, a foaming tankard in his hand.

Game-laws. Since primeval days man has been a carnivorous animal, and has depended for his sustenance largely upon the flesh of the heasts of the field. At first, doubtless, the only thought was of the capture and destruction of animals whose flesh was agreeable to the tasto, not of their preservation and protection for future use. But it is probable that at a very carly age domestication was resorted to in order to meet the scarcity caused by the depletion of the forests and the increased wariness of the animals. There are, however, many animals which, though suitable for food, cannot readily be domesticated, and these still remained the objects of the chase in their natural wild condition. Doubtless for a time these latter were still mercilessly lunted down, but gradually the necessity came to be recognised of husbanding the stock even of wild animals against the future. The analogy of the animal kingdom suggests that the pleasures of the chase were just as keen amongst the nomad tribes in the primeral forests as amongst modern British sportsmen; but the primary object them was not the enjoyment of sport, but the collection of a supply of food, and the value of the wild animals was mainly an economic one. But gradually, as civilisation advanced, as cultivation increased, and other sources of foodsupply were multiplied, the value of wild animals as food diminished, and protection came to be accorded to them rather as objects of sport than

as a valuable food-provision. This condition had already been reached in England with regard to birds and quadrupeds when the Forest Laws were first promulgated, but the economic as superior to the sporting value of fresh-water fish long held its ground, and indeed still does so to a certain extent in the case of some of the larger rivers. Notwithstanding, however, the small value of game as an article of food in proportion to its value as an object of sport, there is still a utilitarian instinct in the pursuit of many kinds of game; the edibility of the animal is a condition of the enjoyment of sport; nothing grieves a sportsman more than to lose an animal he has killed; and no sportsman would go out to shoot old rooks or blackbirds, although these would supply just as difficult shooting as partridges and pheasants.

By the common law, both of England and of Scotland, following that of Rome, wild animals in a state of nature are common to mankind, and are not proper subjects of private ownership. But at an early stage it was recognised that a free right of hunting was incompatible with the preservation of game in such numbers as to afford ample sport to the monarch and the nobles. Accordingly a series of laws known as the Forest Laws (q.v.) were enacted, whereby certain districts of country were set apart for sport to the sovereign and his donees; and effective provision was made to reserve the exclusive right of pursuing game within the protected areas. But the increase of population and the enclosure of large parts of the country rendered protection necessary for the areas outside of the royal forests if the game was not to be totally extirpated, and the result has been a series of enactments known as the Game-laws.

'Clame' includes hares, phoasants, partridges, grouse, black-game, ptarmigan, and bustards. But, in addition, there are a mumber of animals to which one or other of the game-statutes extends protection. These are rabbits, deer, roe, woodcock, snipe, quail, landrails, and wild duck.

Although there is no private property in wild

Although there is no private property in wild animals, it is now fixed partly by statute, partly by consuctudinary law as interpreted by the decisions of the courts, that the right to pursue or take game is a private privilege. In the absence of express stipulation this privilege belongs in England to the occupier, in Scotland to the owner of the soil. It has sometimes been represented that, although a wild animal is not private property, the moment it is taken or slain it becomes the property of the person on whose land it is taken or slain. This is not strictly accurate, for if it were so then the poacher who picks up the partridge he has shot would be guilty of their, which in the present state of the law he certainly is not. On the other hand, there is no doubt that the occupier or owner of the soil is entitled to recover the game from the poacher. The law, therefore, would seem to be most accurately expressed by the statement that the occupier or owner of the soil has a right to claim any game taken or slain upon his land.

The statutory provisions with reference to game are of four kinds—viz. (1) laws for the punishment of poaching; (2) close time provisions for the prection of game during certain seasons of the year; (3) provisions to enable farmers to protect their crops against the ravages of ground-game; (4) revenue and license laws imposing government duties upon the exercise of a right to take or to deal in game.

(1) Pocahing.—The most important of the acts at present in force against peaching are the Day Peaching Act, 1831 (Scotland, 1832); the Night Peaching Acts, 1828 and 1844; and the Peaching Prevention Act, 1862. These statutes impose penalties for trespass by night or by day in pursuit of game,

and for the illegal possession of game; and contain stringent provisions for the detection and punishment of offenders. Night-peaching is treated as a much more serious offence than day-peaching, the reason being that night-peaching, especially by large bands, is apt to lead to acts of serious violence.

(2) Close Time.—This is regulated in England by the Day Trespass Act, 1831, and in Scotland by the Preservation of Game Act, 1772. The close time in England is, for partridges, from 1st February to 1st September; for pheasants, from 1st February to 1st October; for black-game, from 10th December to 20th Angust (1st September in Somerset, Devon, and the New Forest); for grouse, from 10th December to 12th August; and for bustards, from 1st March to 1st September. The seasons in Scotland are the same, except that bustards are not mentioned in the act. By the Day Trespass Act (adopted for Scotland by the Game Certificates Act, 1860) it is also made illegal to deal in game more than ten days after the commencement of close time. It was recently held that this does not

apply to game imported from abroad.

(3) Protection of Crops.—By the Ground Game Act of 1880 an inalienable right to destroy hazes and rabbits found upon his land is given to the occupier. In order to minimise the interference with legitimate sport, it is provided that steel traps shall not be used, except in rabbit holes; that the occupier shall not be entitled to delegate the right to shoot to any person other than one member of his household, specially authorised by him in writing; and that the occupier of moorlands shall be entitled to take hares only between 11th December

and 31st March.

(4) Revenue and License Laws.—The different duties and licenses in connection with taking and the dealing in game are embodied in a series of revenue statutes, which it is unnecessary to enumerate. A game-license for the whole year costs £3; but a license may be taken for half a year to 1st November, or for half a year thereafter at £2; or a license may be taken for a period of fourteen continuous days at £1. A gamekceper's license costs £2. Dealers in game must annually obtain a license from the justices, upon production of which and payment of £2 of duty they obtain an Inland

Revenue license to deal in game. Strong exception is taken to the game-laws by many. It is urged that the provisions for the detection of poachers are harsh and inquisitorial, and there can be no doubt that the difficulty of detecting this offence (arising mainly from the impossibility of identifying the articles taken) has led to the enactment of certain provisions of a very stringent character. Although, however, the provisions are harsh on their face, it may be doubted if it has often happened that any person who had come properly in possession of game, and was able to give an honest account of it, has been subjected to serious inconvenience by the operation of these laws. A much more formidable objection is that the laws are out of harmony with the general sense of a large section of the community; that in the eyes of many respectable persons and of most poachers poaching is no crine; and that many men have by the operation of these statutes been made criminals who would scorn to stoop to any act of ordinary dishonosty. There is force in this objection, for there can be no doubt that, whatever be the explanation, poaching is looked upon by many in quite a different light from any other offence. Prison governors and chaplains tell that they never find a poacher penitent or willing to admit that he has done wrong. The community of the wight to upone either as a primitive tradition or the right to game, either as a primitive tradition or as a legal theory handed down from the Roman

law, prevails singularly enough in the popular mind contrary to the constant practice of centuries.

The game-laws are, on the other hand, defended on the ground of vested proprietary interest, to which great commercial value now attaches, and as affording protection against trespass, which would lessen the agricultural value and the amenity of property. But the strongest plea in favour of the laws affording protection to game is that without such protection game would soon eesse to exist. In an enclosed and thickly-settled country, amidst a crowded population devoted to sport, game would soon become extinct if the public enjoyed a free right to pursue it. In Switzerland, where the only protection is a close time, notwithstanding the numerous natural retreats for wild animals, game is all but extinct, indeed, it is considered a good day's sport for a large party if a single hare is Again, the concession to the occupier of an killed. inalienable right to ground-game by the Act of 1830 has already led to the hare becoming virtually extinct in many parts of Great Britain. In the opinion of some, no doubt, the total extripation of game would be a benefit to the country; but, on the other hand, it is urged that not only does the pursuit of game give zest and variety to rural life, and afford healthful enjoyment in the autumn to a considerable section of the community, many of whom are engaged in sedentary occupations for the greater part of the year, but that it also leads to the diffusion of much wealth throughout the poorer districts of the country, and keeps a great deal of money at home which would otherwise be spent abroad.

In the United States any one is free to capture or kill wild animals, subject to the laws of trespassing; save where, as in several states, laws have been passed protecting game during certain seasons, so

as to prevent its extirpation.

Perhaps the most feasible suggestion which has yet been made for a reform of the game-laws without withdrawing protection from game is that all the statutes against poaching should be repealed, and a simple provision substituted whereby game should be declared to be the property of the person on whose lands it is found. The effect of this would be to render the taking of game theft, and trespass in pursuit of game an attempt to steal. It is urged in favour of this change that it would simplify the law, remove many harsh and anomalous provisions from the statute-hook, and tend to disabuse the popular mind of that theory of the common right to take game which creates disaffection with restraining law. In an uneuclosed and sparsely-peopled country wild animals roam at freedom and care for themselves, and they are not therefore appropriate subjects of private ownership. But in an enclosed, highly-cultivated, and thicklypeopled country, game is just as much dependent for its existence as are flocks and herds upon the protection and care of the owners or occupiors of



the soil, and may therefore, it is said. appropriately be made the subject of private property of those who maintain it. Sec Alex. Porter, The Gamekeeper's Manual (2d ed. Edin. 1889).

Gaming. GAMBLING

Fresh-water Shrimp (Gammarus pulex), magnified.

Gammarns, a genus of Amphipod Crustaceans, includ-

ing numerous fresh-water and marine species One species (Gammarus pulex), sometimes called the 'fresh-water shrimp,' is extremely common in quickly-flowing brooks. It is a tiny creature, about half an inch long, but so abundant that few can have missed sceing it. It generally keeps near the bottom, swims on its side, with a kind of jerking motion, and feeds on dead fishes, &c. In quiet water G. fluviatilis is common, and G. locusta is very abundant among scaweeds along all European coasts. Blind species of the allied genus Niphargus are found in many caves and wells.

Gamrnn. See Gombroon.

Gammt, a name for the musical scale—see MUSIC, SCALE (MUSICAL). Guido of Arezzo, in the 11th century, marked the last of the series of notes in his musical notation with a g or the Greek letter γ (gamma), the name of which came to be used for the whole scale—often in a French form gamme. Gamut is compounded of this word and ut, the beginning of a Latin hymn used in singing the scale. Seo Solfeggio.

Gand. Sec GHENT.

Gandak (the Great Gandak; the Little Gandak being an unimportant tributary of the (logra), a river of India, rises in the Nepal Himalayas, in 30° 56' N. lat. and 79° 7' E. long., flows south-west to British territory, and then south-east, forming for some distance the boundary between the Northwest Provinces and Bengal, and enters the Ganges opposite Patna. Its banks rise above the level of the plains it passes through, and inundations are frequent.

Gandamak, a village of Afghanistan, between Calul and Peshawar, where, during the retreat from Kabul in 1842, the last remnant of the British force was massacred, only one man making his escape. Here also a trenty was signed with Yakub

Khan in 1879. See Afghanistan.

Gandersheim, a small town of 2507 inhabltants in Brunswick, 30 miles N. of Gittingen by rail. Its famous abbey, dating from 852, continued even after the Roformation to give the title of abbess to the daughters of German princes, and putil 1802 was itself a polymerically. and mitil 1803 was itself a principality.

Gandia, a walled town of Spain, on the Alcoy, 2 miles from the sea, and 47 miles SSE of Valencia by rail. It contains the ald palace of the dukes of Gandia, and has some coast trade. Pop. 7604.

Gando, a kingdom of the western Sondan, lying west of Sokoto (to which it is tributary), and on both sides of the Niger as far south as the mouth of the Benne. The inhabitants are mostly Haussa, but the ruling class are Fulahs; nearly all are Mohammedans. The rains are plentiful, the country is fertile, and the vegetation in many places inxuriant.- GANDO, the capital, lies in a narrow valley, surrounded and communded by hilly chains; but the chief commercial town is Egga (q.v.).

Gandolfo. See Castel Gandolfo.

Ganesa, the most popular among the Brahmanic gods of the second rank, the special deity of prudence, invoked at the commencement of every enterprise, and with whose name every book begins (name Ganegaya, 'honour to Ganesa'). He is the son of Siva by Parvati, and the leader of his father's train. Ho is represented with an elephant's head, riding upon a rat, and his figure is found in almost all temples, and also in houses where he has taken the place of the Vedic Agni as domestic guardian.—GANESA is also the name of the author of a 19th-century commentary to the Lingapurana (Bombay, 1858).

Ganga. See SAND-GROUSE.

Ganges, the great river of northern India, prominent alike in the religion and in the geography

ef the East, rises in Gahrwal in 30° 56′ 4″ N. lat. and 79° 6′ 40″ E. long., issuing, under the name of the Bhagirathi, from an ice-cave 8 miles abeve Gangotri and 13,800 feet abeve the level of the sca. A few miles below Gangetri it receives the Jahnavi, and 133 miles from its sonree the the Jalmay, and J33 miles from its source the Alaknanda, from which point the united stream is known as the Ganges. From Sukbi, where it bursts through the Himalayas, it flows seuth-west to Hardwar, and from thence, by a tortnons but generally south-east course, to Allahabad, where it is joined by the Junna. From the sacred tongue of land where the two streams meet the great river seally and in a wide fleet west the lady situ of rolls on in a wide flood, past the hely city of Benares, and across the plains of Behar, fed by the Son, the Gandak, and the Kusi. It then turns sharply to the southward, and, about 20 miles farther en, begins to throw out the branches which farther en, begins to throw out the branches which enclose the level delta, at a point 220 miles in a straight line from the Bay of Bengal. The main channel, called the Padma or Padda, runs southeast to Goalanda, where it is met by the main stream of the Brahmaputra, and the vast confluence of waters flows in a broad estrary, the Meghna, into the Bay of Bengal near Noakhali. Between this most easterly and the Hugli, the most westerly month, lies the delta with a multitude of months mouth, lies the delta, with a multitude of mouths and channels. The Hugli or Hooghly (q.v.) is the great channel of navigation (for map, see CALCUTTA). The delta in its upper angle is very fertile, but in the south, towards the sea, the country is a desolute waste of swamps (see Suncontry is a describe waste of swamps (see SUNDARBANS), intersected by a network of canals. The Ganges has a total length of 1557 (by the Hugli month, 1509) miles; its drainage basin embraces over 390,000 sq. m., lying between the Himalaya and Vindhya ranges, and extending cast to the mountains which separate Burma from Bengal. Not one of the other rivers of India so deserves the gratitude and homage of the Hindus. In spite of the shoals and rapids that lie above Allahabad, it is in some sense navigable from the point where it enters the lowlands, near Hardwar; and its stream, which never fails in the hottest snumer, distributes fertility throughout its course, and even its inundations spread over the fields a rich top-dressing of alluvial silt. The mined or decayed eities near its banks, however, bear mute witness to the loss inflicted by the constant changes which take place in the river-led, altering the whole face of the country, as the river deserts old channels for new. But the Ganges is still one of the most frequented waterways of the world; occan and coast steamers carry goods to Calcutta, and above this city thousands of native boats are employed, even since the development of railways, in played, even since the development of railways, in transporting heavy goods in hilk, such as timber and bamboos, stone, grain, and cotton.—The Hindustani name Ganga, 'stream,' is according to Max Miller an instance of early Aryan reduplication, from the verb to go—'go-go.'

The Ganges excels all the great rivers of India in sanctity; from the source down to the sea every foot of 'Mother Ganga's' course is holy ground, to batho in her waters will wash away sin, to die and be luried on her banks secures from enter to eternal

The Ganges excels all the great rivers of India in sanctity; from the source down to the sea every foot of 'Mother Ganga's' course is holy ground, to batho in her waters will wash away sin, to die and be huried on her banks secures free entry to etornal bliss. Gangotri, Hardwar, Allahabad, Benares, and Sagar Island, the most sacred spots, are visited by thousands of pilgrims every year; the great kumbh fair, which is held every twelve years, drew nearly 1,000,000 persons to Allahabad in 1882—and these of all Hindu sects, for in the legend of the Ganges the three supreme deities of the Hindu pantheon have part. The earliest form of the legend ocenrs in the Ramayana, where Ganga is described as the daughter of the Himalayas, whom Bhagirathi, a prince of Ayedhya (mod. Oudli), after more than twice 30,000 years' solicitation by his father and

grandfather, induces Brahma te cause to descend frem heaven, that his ancestors, who had been reduced to asbes by Vishm, might be sprinkled with the sacred waters, and their sends rise to heaven. The ice-cavern whence the river springs is made the matted hair of the god Siva. The story admits of momerons variations, and the Vishm-Purdna, which assigns the source to the nail of the great toe of Vishm's left foot, sams up the river's properties in this sentence: 'This sacred stream, heard of, desired, seen, touched, bathed in, or hymned day by day, sanctifies all beings; and those who, even at a distance of a hundred leagues, exclaim "Ganga, Ganga," atone for the sins committed during three previens lives.'—Ganga is also censidered as the mother of the ged of war, Karttikeya (q.v.).

Karttikeya (q.v.).

The Ganges Canal, opened in 1854, is an important irrigation work and navigable channel, extending, on the right of the Ganges, from Hardwar to Cawapore and Etawah. The main canal is 445 miles in length, and is navigable throughout; the branches vary greatly from time to time. The Cawapore and Etawah terminal lines are now absorbed in the Lower Ganges Canal, which draws its supply from the river at Narora, in the Aligarh district, and maintains a navigable depth as far as the regulating bridges at Gopalpur and Jeyra, where it joins these branches, afterwards falling into the Junna. The original scheme of the Lower Bengal Canal embraced 555 miles of new trunk lines; in 1873–74 work was commenced on a section of 181 miles. The weir and headworks at Narora include a solid wall, 3800 feet long, with forty-two weirsuluces, founded on hugo square blocks. The ultimate cost of the entire Ganges Canal is calenlated not to exceed 54 millions sterling.

Gangi, a town of Sicily, 18 miles SSE, of Cefala. Pop. 11,935.

Ganglion. See Brain, Nervous System. In Surgery, the name is given to an encysted tumour on a tendon.

Gangotri, a square temple, about 20 feet high, erected on the right bank of the Ganges (q.v.), which here forms a small bay, about 10,319 feet above the level of the sea. This spot is regarded by pilgrims as the source of the holy stream, here called the Bhagirathi, which, however, rises 8 miles higher np. The water here is peculiarly sacred, but few pilgrims come so far, and the only dwelling-house in the locality is occupied by the officiating Brahmans, by whom flasks of the holy element are scaled for conveyance to the plains.

Gangrene (Gr. gangraina, 'a gnawing'), or Mortification, is the death of a part of the body, whether external or internal. It is mest common in the extremities, especially the fect. Its immediate cause is always arrest or impairment of the supply of blood to the affected part. This may be produced in various ways: (1) by direct mechanical injury, or by extreme heat (burn) or cold (Frost-bite, q.v.); (2) by severe septic inflammation, usually following injury, or attacking a wound; (3) by disease of the blood-vessels of the part, in combination perhaps with weak heart action. The second group includes the most dangerens and fatal forms of gangrene: Canerum Oris (q.v.), plagadama, and hospital gangrene, now happily much less common than they once were. The third includes gangrene occurring as a result of poisoning by ergot of rye, of diabetes, old age, &c.

The symptoms and appearances attending gargene vary greatly in different cases. Its onset may be sudden or gradual; it may at once become limited, or it may have a constant tendoncy to extend; it may be preceded and accompanied by

great pain, or may only be observed in consequence of the local loss of feeling. But in all cases the loss of vitality is accompanied by loss of natural warmth, of sensibility and of motion in the affected part, and by a change in its appearance. It may either become moist and swollen, or dry and shrivelled; and its colour may be either dark purple or greenish, or at least at first pale and wavy. The constitutional symptoms are equally variable: if the part affected be small and not vital, and the gangrenc limited, they may be slight and of little importance; otherwise there is generally great depression, with rapid feeble pulse, foul tongue, and other signs of alarming illness.

If the gangrene he limited, a separation takes place gradually between the living and dead parts, and, if the patient survive, the disorganised and lifeless texture is thrown off, and the part heals by Cicatri-ation (q.v.) or the formation of a scar, indicating the loss of substance. With regard to treatment, the strength must, generally speaking, he maintained by a nourishing but not too stimulating diet, and the part carefully preserved from external injury and from changes of temperature.

In some forms of gangrene amputation may afford the best or even the only chance of saving the patient's life; in others its results are disastrons, as it is almost certain to lead to fatal extension of the disease. Much care is therefore needed in deciding the question whether surgical interfer-

ence should be resorted to.

Gaugs, Agricultural, a name specially given to companies of women and boys and girls, brought together for labour in the fen-districts of England, or the low and level tracts which lie south of the Wash. The reclaimed land was mainly enlivated by labourers from the villages, which are numerous on the high ground that borders it. To save expense, the labourers on the reclaimed land here consisted, as much as possible, of women, girls, and boys, working in gangs. An act of 1867 provided that no woman or child was to be employed in the same gang with men or boys, and that no woman or girl was to be employed in any gang under a male gangmaster, unless a woman licensed to act as superintendent was also present with the gang. See Factory Acts.

Gangue (Ger. Gang, 'a veiu'), the stony matrix in which metallic ores occur. Quartz is the most common gangne, but cale-spar too is very frequent, and barytes or heavy-spar, and fluor-spar are also of common occurrence. Large portions of the gangne are generally worked and submitted to metallurgic processes for the sake of their contents.

Gan-hwuy, or AN-HUL, an eastern inland province of China, intersected by the Yang-tse-Kiang. See CHINA.

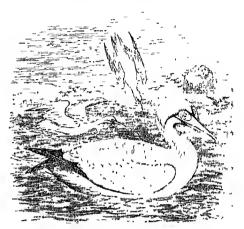
Ganister, or Calliard, the name given in the Yorkshire coalfield to a hard, clase-grained siliceous stone, which often forms the stratum that underlies a coal-seam. Such hard 'seat-earths' are most common in the lower coal-measures; hence these strata in Yorkshire are often termed the 'Ganister Beds.'

Ganjam, a town of Madras presidency, at the mouth of the Rishikuliya, 18 miles NE. of Berhampur. It was remarkable for its fine buildings, but in 1815, in consequence of an epidemic fever, the civil headquarters were removed to Chicacolc. Pop. 5037.—Ganjam district extends along the Bay of Bengal, in the extreme northeast of the Madras presidency. Area, 8311 sq. m; pop. (1881) 1,749,604. The cluef town is now Berhampur.

Gannat, a town in the French department of Allier, on the Andelot, 245 miles SSE. of Paris

by rail. It has a church dating from the 11th century, and its heer is famous. Pop. 5034.

Gamet (Sula), a genus of web-footed birds, in the family Sulida, and the order Steganopodes, which also includes pelicans, cormorants, and snake-hirds. The head is large, the face and neck naked, the bill straight and strong, longer than the head; the toes (4) are long, and all connected



Adult Gannet or Solan Goose (Sula bassana).

The genus includes about eight hy the weh. species, from temperate and cold sons. They fly, swim, and dive well, but are awkward on land; they feed upon fishes, live socially, and nost in crowds on clills and rocky islands. The best-known species of Gamet is the Solan Goose (S. bassana), whose popular name is akin to the Ico-handie salan, 'n gamet,' while it derives its specific title from the Bass Rack of the Firth of Forth. It is common enough in north Europe from March to October, but migrates southwards—e.g. to Glandtar, in late autumn. Landy isle, the Bass Rock, Ailsa Craig, St Kilda, Suliskerry, and Skelig (Ireland) are celebrated British breeding-places. The entire length of the solan goose is about three feet; its general colour milk-white, the crown and luck of the head pale yellow, the quill-feathers of the wings black. The young bird, when newly hatched, has a naked bluish-black skin, but soon hatched, has a maked hunsh-place skin, but soon becomes covered with a thick white down, so that it resembles a powder-pull, or a mass of cotton. When the true feathers appear they are black, with lines and spots of dull white, so that the plumage of the young is very unlike that of maturity. The bird is long-lived, and takes about four years to come to maturity. It extends its flight to great distances from its really lead. its flight to great distances from its rocky head-quarters, pursuing shoals chiefly of such lish as swin near the surface, particularly herring, pit-chards, and related forms. The presence of a shoal of pilchards often becomes known to the Cornwall ishermen from the attendant gannets. When feeding, the bird always flies against the wind at an altitude of not more than about 100 feet above the surface of the sea. When it espices a lish it instantaneously stops, and with wings half distended, stoops and swiftly cleaves the air. When within a yard or two of the surface, and just as it makes the plunge, the wings are chapped close to its sides. Thus the hird enters the water like a bolt. The nests on the rocks are roughly built of seaweeds and marine grasses, and are imiddled together on the available ledges and nooks. The single egg has a chalky white colour, and the surface of the shell is rather rough. During incubation

the goose will often allow itself to be touched with a stick without rising from the nest. number of gamets that annually visit the Bass Rock in the Firth of Forth is estimated at from sixteen to twenty thousand. The young are killed by cliffmen who are lowered down the rock by a rope; they are valued for the sake of their down, flesh, and oil, which bring a profit to the person who reuts the rock. On and around the Bass gannets are seen in prodigious numbers, the air around the rock being filled with them, like bees around a hive, and the rock itself whitened by them and their accumulated excrements. The deafening noise of the harsh cries they nater when they are excited or disturbed adds to the impressiveness of their snowflake-like numbers. flesh is rank and oily; but that of the young, baked, is eaten to a considerable extent in many places, and is even reckoned a delicacy. The eggs places, and is even reckoned a delicacy. The eggs are considered by many councisseurs to be a decided delicacy. They are boiled for twenty minutes, and caten cold, with vinegar, salt, and pepper. S. variegata, extremely abundant in some parts of the southern lemisphere, is said to be the chief producer of gnano; and S. piscator is the well-known phlegmatic boohy.

Ganoids, an order of fishes once very large, but now decadent, being represented by only seven living genera. These are (1) predominantly cartilaginous forms—Acipenser (sturgeon), Scaphirhynchus, Spatularia (or Polyodon), and (2) bony Ganoids—Polypterus, Calamoichthys, Lepidosteus (bony pike), and Auna. On the other hand, the majority of fossil fish in paleozoic times are Ganoids—e.g. Pterielithys, Coccosteus, Cephalaspis, Pteraspis, Rhizodus.

The general characters are noted under frame. are noted under FISHES.

Gantang Pass, in 31° 38' N. lat. and 78° 47' E. long., leads eastward from Kunawar, in Bashahr, into the Chinese torritory. Its height is 18,295 feet above the sca, and it is overlung by a peak of its own name, nearly 3000 feet loftier. The place is unspeakably desolate and rugged, and, being devoid of fuel, it is but little frequented.

Gantlet. See GAUNTLET.

Ganymede, the cup-bearer of Zeus, was, according to homer, the son of King Tros and the nymph Callirrhoë; or, according to others, of Laomedon, Ilus, or Erichthonius. The most beautiful of mortals, he attracted the notice of the king of the gods, who determined to make him his one bearen according to the bearen according to the control of the contro his enp-bearer in succession to Hebe, and accordingly despatched his eagle to carry him off to heaven. The Greeks believed that Zeus gave Tros a pair of divine horses as a compensation for his loss, and comforted him at the same time by informing him that Ganymede had become immortal and free from all earthly ills. At a later period he was identified with the divinity who presided over the sources of the Nile. The Greek astronomers likewise placed him among the stars, under the name of Aquarius ('the water-bearer'), in allusion to his celestial function. Ganymede was a favourite subject of ancient art, and in modern time has prompted the genius of Carstons and Thorwaldsen.

Gaol. See Prison.

Gaol Delivery, Commission or, is one of the commissions issued to judges of assize and judges of the Central Criminal Court in Eugland. See

Gap, the mountain capital of the French department of Hautes Alpes, is pleasantly situated on the Luyo, 2424 feet above sea level, among vine-clad slopes, 47 miles SE of Grenoblo, by a branch line. It has a cathedral (rebuilt since 1866), and

some manufactures of silk and cotton fabrics and Pop. (1886) 9345. Gap, the ancient Vapinhats. cum, was formerly a fortress of some importance, and gave the title of Gapençois to the surrounding district of Dauphine.

Gapes, a disease of fowls and other birds, due to the presence of threadworms or Nematodes (Syngamus trackcalis) in the windpipe. As a large number (twenty) may be present, the worms cause inflammation, suffication, and death. The worms breed in the trachea, embryos are conglied up, and, if swallowed by the same or other birds, pass from stomach to air-sacs, lungs, and eventually to the windpipe. As to the external life of the embryo there are two theories: Meguin, for instance, says that they get into the food when conglied up, and thus pass very directly from fowl to fowl; while II. D. Walker has given strong reasons for suspecting that they pass first into the earth, then into carthworms, and thence into birds. For treatment, see Poultry (Diseases of). See also Nematodes, PARASITISM.

Garabit, a point on the railway from Marvejols (Lozère) to Newssargues, about 10 miles S. of St Flour, in the French department of Cantal, where rour, in the French department of Cantal, where the line crosses a gorgo through which the waters of the Truyère run, 401 feet below the rails. The riadnet, the work of M. Eiffel, is built partly of girders and partly of masomy, and has a total length of 1852 feet 6 inches. Where it crosses the river it is supported by an arch, with a span of no less than 511 feet 4 inches. See Engineering (1885), and Eiffel, Le Viadue de Garabit (1889).

Garamantes. See Fezzan.

Garancine, a dysstuff derived from Madder (q.v.). See DYEING, Vol. IV. page 136.

Garay, János, Hungarian poet, horn at Szeg-szárd in 1812, lived mostly at Pesth, where he obtained in 1847 a post in the university library, and died 15th November 1853. His study of the masterpieces of German literature and of Yorismarty hore fruit in numerous dramas, chiefly of historical character: Csab (1835), Arborz (1837), and Orszgák Hona (1837), as well as long poems, as Usatar, an epic (1834), and Szent Laszlo, a historical poem (1850). In 1847 he published Arpadok, a poetical version of the historical legends of Hungary, and next year Balatoni Kagylik, a collection of lyrics. A complete edition of his poems was published by Franz Ney (5 vols. Pesth, 1854), a selection in German by Kertheny (2d ed. Vienna, 1854). 1857), and a Life by Ferenczy (Posth, 1883).

Garaye, LA, a ruined château in Brittany, 2 miles from Dinan. Its last owners, Claude Tonssaint and his countess, in the first half of the 18th century converted it into an hospital, which forms the theme of the Hon. Mrs Norton's poem, 'The Lady of La Garaye' (1862).

Garb, or GARBE (Fr. gerbe), a sheaf of any kind of grain. A garb is frequently used in heraldry.

Garcia, MANUEL, vocalist and composer, was born at Scyille, in Spain, 22d January 1775. After acquiring a considerable reputation as a tenor singer in Cadiz and Madrid, in 1808 he obtained great success at the Italian Opera in Paris, and afterwards proceeded to Italy, where he was received with equal favour. From 1816 to 1824 he was constantly engaged as a singer, either in Paris or London. In 1825, with a select operatic company, composed in part of members of his own family, he crossed the Atlantic, and visited New York and Mexico. On the road between Mexico and Vera Cruz he was robbed of all his money; and after his return to Paris he was compelled to open a class for singing, as his voice had become greatly impaired by age and fatigue. Many of Garcia's

pupils reached a high degree of excellence, but none equalled his eldest daughter Maria, afterwards Madame Malibran (q.v.). He was less successful as a composer, although several of his works, such as Il Califo di Bugdad, were much admired. Garcia died at Paris, 10th June 1832.—PAULINE VIARDOT-GARCIA, his second daughter, born at Paris in 1821, acquired a considerable reputation as a mezzo-soprano singer, and also composed several

operettas and songs.

Garcilaso, a Spanish historian, surnamed the Inca, from his mother, a princess of the royal race of the Incas, was son of Garcilaso de la Vega, one of the conquerors of Pern, and was born at Cuzeo in 1540. At the age of twenty he proceeded to Spain, and lived the rest of his life at Cordova, where he died in 1616. His first work was La Florida del Ynca (1605), an account of the conquest of that country by Fernando de Soto. In 1609 appeared the first, and eight years later the second In 1609 part of his great work on the history of Peru, entitled Commentarios Reales, que tratan del régen de les Incas reyes, que fueron del Perú. Garcilaso's Royal Commentaries was translated into English by Sir Paul Rycant (1688), and by C. R. Markham for the Hakluyt Society (1869).

Garcilaso de la Vega, a great Spanish poet, was born at Tolcho about 1503. He early adopted the profession of arms, and gained a distinguished reputation for bravery in the wars carried on by the Emperor Charles V. against the French and Turks, but was mortally wounded while storning a castle near Fréjus, in the south of France, and died at Nice, November 1536, in the thirty-third year of his age. Though prematurely cut off, he lived long his age. Though prematurely cut off, he lived long enough to win immortality; and, though he wrote little, he rovolutionised the national poetic taste of his countrymen. For the short metre of the older romances and redondillas he substituted the heudecasyllabic verse of the Italians. Strangely enough, his poems contain not a trace of military ardour, but are inspired by a tender sweetness and melancholy which appear to have deeply affected his countrymen. 'His sonnets,' says Ticknor, were heard everywhere; his eclogues were acted like popular dramas. The greatest geninses of his nation express for him a reverence they show to none of his predecessors. Lope de Vega imitates him in every possible way; Cervantes praises him more than he does any other poet, and cites him oftener. And thus Garcilaso de la Vega has come down to us enjoying a general admiration analyse. down to us enjoying a general admiration, such as is hardly given to any other Spanish poet, and to none that lived before his time. The best of the numerous editions of his poems is that by Azagra (Madrid, 1765). They have been translated into English by Wiffen (1823).

Garcinia. See Mangosteen.

Gard, a department in the south of France, on the Mediterranean, and bounded on the E. by the river Rhone, with an area of 2245 sq. m., one-third of which is arable. It is watered mainly by the Rhone, and by its tributaries the Gard—from which the department has its name—and the Ccze. Of its surface the north-west is occupied by a branch of the Cevennes, the remainder slopes toward the Rhone and the Mediterrancan, the coast being lined by extensive and unhealthy marshes; the climate here is unwholesome, and in summer the heat reaches 104° F. The soil is unequal, the best land occurring in the river-valleys. The famous grapes have almost disappeared before the ravages of the phyllogens, less and less lead weathings. of the phylloxera; less and less land yearly is retained for vineyards; and the production of wine has sunk to less than a fourth of what it was before 1875. The rearing of silkworms is widely engaged in, and the cultivation of olives and chestants is of value. The minerals include coal, iron, argentiferous lead, antimony, marble, and salt; and the department's iron and steel works are important. The department is divided into the four arrondissements of Alais, Nîmes, Uzes, and Vigan; the chief town is Nîmes. Pop. (1861) 422,107; (1881) 415,629; (1886) 417,099.

Garda, LAGO DI (the Lacus Benacus of the Romans), the largest lake of Italy, lies between Lombardy and Venetia, its northern end extending into the Austrian Tyrol. Situated 226 feet abovo into the Anstrian Tyrol. Situated 226 feet above sca-level, it has an area of 115 sq. m., a greatest length of 35 miles, a breadth of 2 to 11 miles, and a maximum depth of 967 feet. Its chief tributaries are the Sarca and Ponnle, and it is drained by the Mincio, a tributary of the Po. The scenery is grand: at the north cud alpine spars border the lake on both sides, and descend steeply to its shores, but contain within themselves also many beautiful and fertile valleys; farther to the south the country sinks by centle farther to the south the country sinks by gentle slopes to the level of the plain of Lombardy. Along the western shore the mulberry, fig. grape, myrtle, and eitron are grown in the sheltered gardens, many of them terraced; olives flourish most on the opposite bank. The clear waters of the lake abound in fish of various kinds. Its surface is studded with many islands, and steamers ply hetween the principal points. The mild climate in the district of eipal points. The mild climate in the district of the lake, and the beauty of its vicinity, have caused its shores to be lined with beautiful villas; and the district between Garguano and Salo, called by the people La Riviera, passes for the warmest point in northern Italy. Areo, near the head of the lake, is growing in favour as a winter-resort. The neek of land jutting out for 2 miles from the southern shore, and now called Sermione, is the Sirmio praised by Catallus, who had a country-house here, the decline of popularity.

as the 'darling of peninsulas. Gardaia, or GHARDAIA, the Mozabite capital, in eardana, or entardata, the mozame capital, in the Algerian Sahara, stands on a conical hill, in an oasis-valley full of date palms, 1740 feet above sealevel, and 82 miles WNW. of Wargla. The town is surrounded by a low, tarreted wall, and in 1882 a fort was built by the French, who placed a garrison here. The place is now included in the territoire militaire, and appears in the census of 1886 with a population of 26,448.

Gardant, in Ucraldry, is said of an animal which is represented full-faced, and looking forward. See Passant.

Gardelegen, an old town of Prussian Saxony, on the Milde, 28 miles (53 by rail) NNV. of Magdeburg, with a foundry, manufactures of buttons, &c. Pop. 7258.

Garde Nationale. See NATIONAL GUARD.

Garden City, the Episcopal cathedral town of Long Island, in the barren Hompstead Plains, 19 miles E. of Brooklyn by rail, was laid out as a town of model villas by the New York millionaire, A. T. Stewart, who laid down 27 miles of bonlevards, and planted come 50 000 trees. The widelyn greeted and planted some 50,000 trees. His widow creeted here a Gothic cathedral (1877-85), a crucitorm building, small, but profuse in detail and ornament, with western spire and circular apse. Close by aro the bishop's residence and the cathedral schools, besides other seminaries. Pop. 574.

Gardeners' Garters. See Canary Grass.

Gardenia, a genus of Cinchonaceae, tropical and subtropical trees and shruls, frequently introduced for their beautiful and fragrant flowers—e.g. G. flovida and G. radicans from Japan, and other species from the Cape, where their hard timber also is esteemed. The fruit of other species is used in dyeing silks yellow. The colouring principle is identical with that of saffron (Crocin). The

Indian G. arborea and gummifera yield a yellow resin. The name was given by Linneus in honour of Dr Alexander Garden, born in Scotland in 1830, who practised medicine in Scuth Carolina, became eminent as a botanist, and died in London in 1791.

Gardening, or HORTICULTURE, the ordering and management of a garden, differs from agricul-ture chiefly as being conducted on a smaller scale and with more minuteness, while concerned with a greater variety of subjects. As in a house, so in a garden (though the line is seldom quite distinct), part is devoted to comfort and enjoyment, and the other part to provision for them, the former part forms the pleasure-ground, and the latter the kitchen-garden. Leaving vinery, pinery, hothouse, greenhouse, &c., as special matters, we glance briefly at our subject in this distribution.

The pleasure-grounds comprise the lawns, the subject the distribution of the pleasure of the subject the subject that the subject the subject to suppose the suppose the subject to suppose the subject to suppose the suppose

walks or drives, the flower-bods, ornamental trees and shrnbbery, and, in large places, torraces, lakes and fountains, statues, rockwork, fernery, and the

The kitchen-garden, being designed for the supply of fruit and vegetables, contains the trees, plants, and bushes needful for that purpose, with proper walks for access to them, and appliances, such as hotbeds, pots, and frames, &c., for advancing or improving them; and is often enclosed either partly or wholly by a wall, which shelters and promotes

the growth,

(1) The pleasure-ground (or flower-garden), however small, has almost always one grass-plot, which is called a lawn, though it may be but a little one. Whether space be scant or ample, the lawn is the leading feature and the most pleasant part of the pleasure-ground, and it should be well kept first of all. This can be done at small expense by frequent use of the 'lawn-mower,' which has quite superseded the scythe wherever the slope of the ground permits it. It is, however, of prime importance that the grass should be of the proper kind, and not of rank or wivy growth. Hence the most perfect lawns are made by the sowing of carefully selected seed rather than by laying turf, though the latter is the quicker process. In any case, the use of the roller must not be neglected, and during the time of rankid growth the lawn-mower, set for cutting of rapid growth the lawn-mower, set for cutting close, should be employed at least twice a week. But it is a mistake to mow very closely during periods of drought. All weeds should be extiruated as soon as they appear, and moss (which is in damp situations the worst of all foes) must be checked

at once, or it will soon destroy the herbage.

The walks are even more important in many cases than the lawn or lawns, and unless they have been made with skill and care they will always be troublesome. A dry, compact, and even surface, without which no good walk can be, is not secured without depth of substance, proper form, and good drainago. The depth should be at least 12 inches, to secure freedom from weeds and worm-easts, as well as a firm, dry surface. Nine inches of brick-rubbish, elinkers, chalk, burnt earth, or other open and absorbent matter should underlie 3 inches of good binding gravel, and the middle should be rounded well to carry off the rainfall, for which purpose also there must be drain-traps on either side conducting into cosspools, or other receptacles of ample capacity. The position and frequency of these drain-traps must depend upon the slope of the ground, the average rainfall of the place, &c. It is false economy to stint the width of walk, even when carriages are not required. No walk should be loss than 5 feet in width, unless there is some special reason, and 6 or 7 feet should be afforded even to a side-walk of any importance. It is a common practice to scatter salt or other poisonous matter on walks to dostroy the weeds or worms,

but the remedy is generally worse than the disease. With proper care a walk can be kept clean, and looks more cheerful without these applications.

As to the flower-beds, their arrangement and composition should depend upon the taste of the owner, which is teo often set aside in favour of the passing fashion. A commen mistake in small gardens is to cut up the grass inte intricate patterns with a number of fantastic flower beds, and to lay them out in colenrs, like a window of stained Or even the same bed is planted with stripes and sweeps of every tint produced by bloom and foliage, and the stiff artificial effect is called a triumph of earpet-bedding. Happily this taste is growing obsolete, and a more natural style is in vogue again. But the opposite extreme must be avoided, that of having flower-beds without flowers. The borders should have at least two bright periods, that of spring-blooming bulbs and tubers, from March to the middle or end of May, and again that of hedding plants, from the latter part of June till the frost of antunn nips them. In the larger flower-beds there are also some perennial plants or shrnbs of dwarf habit, such as roses, azaleas, rhododendrons, and the like, which form the back or centre, according to the slope. Whatever the shape may be, every flower-bed should have sufficient slope of soil and definite edging, whether of turf, or tiles, or box, or other dwarf-growing and turf, or tiles, or box, or other awari-growing and tidy plants; and the surface should be dressed at least once a year, if the soil cannot otherwise be ronewed, with rich material of neat appearance, such as thoroughly rotten manure, decomposed vegetable substance, &c., the darker in colour the better, but light in substance, and not apt to bind. The plants employed for summor bedding (which should be done towards the end of May) have should be done towards the end of May) have generally been raised under glass in small pots, and their variety is almost endless, new ones being introduced continually. As a general rule those of prostrate or very low babit should be in front, with taller growth towards the centre or back, and a pleasing contrast or change of colour. Most of them will flower for weeks in succession, if well watered and not allowed to seed—for the formation of seed checks the growth at once,

In large pleasure-grounds ornamental trees add much to the beauty of the scene, by graceful form or that of foliage, and sometimes by brilliance of bloom or berry. As a general rule these should stand far apart, unless there is something unsightly stand far apart, unless there is sometiming unsignity to conceal, and should not be vory near the dwelling-house, except where shelter is needful. The choice and arrangement belong rather to the department of landscape-gardening, but none should be planted which have not been proved capable of onduring the coldest winter or the roughest weather they are likely to confront. This cantion applies especially to all the race of imported conform that of which cap withstand a winter of eonifers, few of which can withstand a winter of exceptional rigorr. Thus in the second half of the 19th century, in 1860, 1867, and 1881, that general favourite the Abies, or Cedrus Decdara, has been greatly injured by frost, even in the south of England.

The shrubbery also is a pleasant adjunct wherever space is plentiful, affording the coolest walk in summer, and in winter the most sheltered. The shrubs should be mainly evergreen, though a few The decidnous may be admitted for the sake of the bloom or variety of colour. But forest-trees must not be

Other features of the pleasure-grounds, such as terraces, lakes, and fountains, &c., pertaining rather to the domains of the wealthy, will be treated more aptly under the head of LANDSCAPE-GARDENING. But a place without any very great pretensions may have its rockwork and femery,

which are often combined in some sheltered spot, and offer a pleasant ictreat from the glare of the flower-beds or trimness of the lawn. Many good judges pronounce that statues are out of place even in the largest garden, intruding on the sense of repose, and competing for attention with fairer But, if the owner must have them, ho nature. should not post them too conspicuously, and should have them as little as possible at enmity

with nature.

(2) The kitchen-garden, for the supply of fruit and vegetables, is generally kept out of view from the louse, either by walls or a fringe of trees or shrubs. This also should have good walks and diainage; but use is more studied than appearance that had graceful curves are dispensed with, and the ground is divided conveniently into squares or parallelograms. When the case permits, this garden is enclosed by walls of stone or brick—the latter to be preferred for fruit—and should slope towards the south or south east, and must not be overlung by trees. There are very good gardens not favoured thus; but the ideal kitchen-garden perhaps should be a square of from one to two aeres, share of sunshine, the south-east aspect is quite as good as the south, and the south-west not very far inferior, at least in the warmer part of England, while the north-east aspect is much better than due north for Morello cherries or other hardy fruit. Parallel with the walls inside are borders from 12 te 25 feet in width, parted by straight walks at least 6 feet wide from the squares or parallelograms forming the chief area, which are intersected by paths at right angles, with two main walks crossing at the centre of the garden. Very often these inner squares, or quarters, are eropped with vegetables or bush-fruit, while the wall-borders are reserved for strawberries, early lettuce, kidney-potatoes, or other dwarf growth which is advanced by the warmth of the situation. Although the produce of the kitchen-garden may be roughly distinguished as vegetables and fruit, the two are very seldom kept entirely apart, the general practice being to erop the ground with vegetables between the lines of fruit-trees. And it is still more difficult to part the two by any botanical definition. Pepular usago must therefore be followed, though even this is sometimes uncertain, the tomate, for instance, being assigned by some to the fruit and by others to the vegetable class.

In common parlance, vegetables are described as plants grown for culinary uso. Of some the esculent part is the root; of others, the stem or foliage; of others, the bloom or its receptacle; of others, the seed, whether ripe or unripe, and with or without its capsule. As an instance of each may be given the carrot, eelery, cabbage and canli-flower, peas and beans, of which latter the seed is consumed without the pod or with it, according to the variety. The vegetables chiefly used in Britain are as follows, some attempt being made to place them according to their importance, though all households may not concur in this. The potato, the cabbage tribe (including the hearted cabbage, the cabbage-trine (including the neared cabbage, the colewort, the savoy, the broccoli, and cauliflower, seakale, conve tronchuda, and others), onions and leeks; salad-plants, such as lettuce, endive, radishes, &c.; the leguminous—i.e. peas and beans, of several varieties; the carrot, celery, turnips and parsnips, asparagus, spinach, rhubarb, beet-root, shallots and chives, artichokes (both Jerusalem and globe), cneumbers and marrows, salsify and scorzonera, horse-radish, and culinary herbs of divers kinds. The tomato or love-apple (Lycopersicum esculentum) has of late years become so popular, and is considered so wholesome, that it claims a high place in

the foregoing list, which is not presented as exhaus-For all of these plants a soil of medium staple is desirable, for a stiff clay is cold and too retentive of moisture, while a sandy or gravelly land both suffers from drought and affords little nourislaneut. The soil which gardeners describe as a rich loam is the best of all for their purposes; and if it be 3 or 4 feet in depth, with a substratum of gravel to ensure drainage, it will grow the very lest vegetables, without that excess of manure which is apt to increase the size, but to impair the flavour. Space forbids as to do more than eite a few general rules to be observed in the growth of vegetables, and there are plenty of excellent books on the subject.

A heavy sail is much improved by the mixture of light materials, such as sand, ashes, lenf-mould, road-scrapings, or anything that tends to keep the surface open and the nurs more permeable. A poor sandy staple, on the other hand, should be unde more retentive and tenacions by the addition of elay or heavy loam or manures of a moist and substantial kind. Whatever the soil be, it should substantial kind. Whatever the source, it snown be moved deeply at every time of planting, but the subsoil, if very poor, should not be brought up, especially for shallow-rooted plants. All the cabbage-race, and nearly all plants that are grown for their flower or foliage, require strong nurture and plenty of moisture; while many plants cultivated for the sake of the root, especially the potato, are injured by rocking and heavy manners. Even are injured by rocking and heavy manures. Even the onion, though it likes a rich bed, should not have a rank one. Watering, if once begun, should have a rank one. Watering, if once begun, should be repeated, until there is sufficient rainfull. The use of the hoc between growing plants is most beneficial, and the surface should be kept loose and open. Let nothing run to seed, unless the seed is wanted. It is better to give too much space than too little, and the sequence of crops should be carelike, when it can be avoided. If it cannot be avoided, the ground should be deeply turned over, and plenty of fresh nourishment supplied. In planting, lot the fibrous roots he spread well, and the soil made lirur round the stem or collar. Whother the crop is sown or planted, the drills or rows should be so arranged that the sunshine may pass along rather than across them, and few plants come to perfection under trees even in the brightest summers

Fruit, which forms an important part of kitchengarden produce, is ranged in three classes generally, according to its mode of growth, whether on plant, or bush, or tree. Of plant or ground fruit we have chiefly the strawberry and the molon. The latter is rather a subject for cultivation under glass-although in warm spots and fine summers the hardier sorts may succeed in the open; but the strawberry is to be found in almost every kitchenstrawberry is to be found in almost every kitchengarden, a universal favourito, and not difficult of eulture if the right kinds he selected. A sunny wall-border deeply dug, and then trodden firm, if the soil be light, is the best position for the early kinds. The distance between the plants is governed by the vigour of the growth, but the rows should generally be two feet apart, or even three, when the growth is very strong. The beds should be renewed every second or third year, according to the constitution of the kind. Probably this fine fruit takes its name, not (as is often supposed) from the use of straw to keep it clean, but from the way in which the berries, clean, but from the way in which the berries, having but a slender footstalk, are strewn or strawn by their weight upon the ground.

Of bush-fruit the most important are currants, gooseberries, and raspberries, the former two being raised from cuttings, and the last from suckers. Raspberries delight in a rich and heavy soil, and a place where no drought can reach them. The black

current also rejoices in moisture; but the white and red currants and gooseberries thrive well in

lighter places.
Tree-fruit is of many kinds, and grown in divers manners. A broad distinction was made of old betwixt wall-fruit and that of standards, as if the But now it is acknowledged that any fruit which can be ripened thoroughly or brought into proper state for gathering 'in full wind,' as the French express it, will prove of higher flavour and of finer flesh than if it had received the relaxing influence and coddling of a wall. Still, the wall affords much fairer chance of protecting tender bloom from frost, and heavy fruit from winds, as well as of ripening later kinds, which ought not to be called till

Taking wall-fruit first, we find the following chiefly favoured thus: the peach, the nectarine, and apricot, the finer sorts of plums and gages, cherrics, pears, sometimes apples of dessert varieties, and also figs and hardy grapes, which ripen in warm seasons and warm places with good management. For stone-fruit the usual mode of training is to spread the branches against the wall in radiations, like those of a fan, removing the breast-wood while quite young, and laying in the bearing wood on one or both sides of the leading branches, and at proper intervals. Very few gardeners understand the education of a wall-tree; and a peach-tree perfectly trained and equally balanced, yet full of vigour, is one of the fairest and rarest sights. Nothing less than loving labour and great skill can bring this to pass; but for ordimary work and good results these points must be attended to—vermin must be nipped in the bul, gross shoots must be removed or reduced, and redundant fruit taken off right early. These rules apply to the pear as well, when trained against a wall, although that fruit is less oppressed by insects, and the tree is usually trained in the horizontal or rectangles form. zontal or rectangular form—that is to say, with side-branches issuing at intervals of about a foot from the main stem or leader. Another mode of training, called the 'cordon system,' is now in vogue with the pear, the plum, cherry, and other wall-fruit. This is not by any means a novelty, but rather a revival; and where the walls are high, and many varieties are needed, it is sometimes employed with good effect, though the difficulty is to repress the longing of the tree for ampler foliage. It is a system of strict repression, and the victim requires frequent care; and even at the best we have a triumph of art over nature, instead of with

Without the aid of a wall, fine fruit-quite as handsome in some eases, and often of better quality—can be grown in good sthations and average seasons with ordinary skill. Trees planted thus for fruiting 'in full wind' are described as either standards, pyramids, or bushes. The first have a single stem free from branches for soveral feet above the ground—perhaps 6 feet is the average. There the branching begins, and the growth continues according to early treatment, with either an upright leader or open divergence of cocqual shoots. This tall growth is mainly used for orehards now, or in gardeus for planting alternately with pyrahandsome in some eases, and often of better quality or in gardens for planting alternately with pyramids or bushes. The pyramid—more correctly perhaps it should be termed the conical tree—is formed by allowing the lower shoots to romain, and even encouraging them (when the habit of the sort requires it) by stopping the leader at intervals, so that we have a young tree furnished with tiers of side shoots from the base upwards in regular succession, yet still possessing a central upright. In the bush the leader has been removed, if there ever was one—for some varieties branch thus by nature;

and then we have a spreading growth without any central occupant, as the nut-trees are usually formed in Kent, and the current and gooseberry everywhere.

Where space is restricted and growth must be compact, the conical form of tree suits well, and offers most temptation to those who love experiments. But when great bulk of fruit is called for, either the 'pyramid' must be allowed to earn its name by magnitude, or the free and tall standard must have its own way, with coercion administered productly. Many writers, especially unrecrymen, have pleasure in proving that the maximum of fruit is to be achieved with the minimum of tree; lut nature works otherwise, and if she be not heeded experience will impress the error. tinual lifting and pinching of trees (alternated as such correction is with doses of rank liquor) act upon their systems as feast and fasting night act upon the gardener. To those who have not studied the precepts (rather than the practice) of recent

authorities this will appear a traism.

Without controversy, it is enough to say that in this, as is in most other matters, the middle course is the best and safest. Fruit-trees in the open should be planted at fair distance from one another; pyramids of strong sorts 10 feet asunder, and of weakly kinds not less than 8; standard-trees 15 feet apart, to do justice to themselves and allow it for some years to the lumbler growth belwixt them. Many must be checked in their lateral spread until they have filled their forms, not densely, but with equable bearing wood; and none should be allowed to sacrifice their future for the sake of present gain. It should also be borne in mind that stone-fruit, if any is thus grown, does not bear the knife as kindly as the pears and apples do. If the plum and cherry must be brought into the form of bush or cone, it can only be done into the form of bush or cone, it can only be done to good effect by nipping the young growth before midsummer, and by very slight winter-pruning. Any aniquitation of thick branches produces gumming, and maims the tree. To achieve the pear and apple in small compass and with quick increase dwarfing stocks are much employed, the pear being grafted or budded on the quince, and the apple on the Paradise or doucin. Many varieties thrive the Paradise or down. Many varieties thrive well on these, some for many years, and others for a shorter time, according to their liking; and larger and inner coloured fruit is the early result of the union. Nurserymen by experience know what sorts to offer in this form, and what are less complaisant. The espalier also, which may be termed a multiple form of eordon, is frequently found in kitchen-gardens, though not universal as in days gone by. The tree is trained horizontally on stakes, or wires, in tiers proceeding from the central stem, and for heavy fruit this method doubtless affers more stability; but the disadvantages are many, and in common with the quenorally children in the stability of its the stability of the stability of the stability. (which is a modification of it) the espalier has yielded place to the less exacting pyramid.

For fruit-trees, as for vegetables, a few well-

known but often slighted eautions may be offered. Let sufficient space be given; luxuriant growers may sometimes stand alternate with the feebler; let no tree be planted deeply, nay, if the soil be wet and heavy, plant almost upon the surface, banking up and staking well. Remove the coarser taproots if there be enough of fibre; prune but slightly, if at all, until fresh growth has started, and then be not too hard with it. Do not clog with rank manure, but let the ground have been well worked before the tree is planted. Give the needful nurture, when the fruit is taxing the resources of the root, either by mulching with fat manure, or presenting it in liquid form. Let not the tree be overcropped: a hundred puny fruits are not equal in bulk to a score of fine ones, and far less in quality, yet they exhaust the powers of the parent more than the worthy progeny. Be careful parent more than the worthy progeny. Be earlied as to the time of enling: even the earliest fruit should not be allowed to get dead-ripe on the branch, whereas the winter kinds are often gathered prematurely, especially under the menace of a storm. General pruning should be done in winter, when the trees have filled their spaces, and should be tempered with mercy; but for this direction will be found in our article when that subject tions will be found in our article upon that subject.

Hot-beds in the kitchen-garden are chiefly for promoting and protecting early growth of tender stulf, such as marrows, cucumbers, potatoes, mushrooms, &c. No description, but experience alone and common sense can give the key to the management of this close work. Only it may be said that half the failures which occur are caused by excess of heat, stint of air, and injudicious coddling.

also PLANT-HOUSE.

The gardener, whether he has to study beauty or ntility—not that these are discordant powers—must endeavour to move along the broad walk of intelligence, despising nothing because it seems new, still less because it is old; and striving to learn from others all he can, and from himself the whole of it. The multiplicity of art for him is multiplied by the infinitude of nature, and before he is out of his rudiments his time comes to be

made perfect,

made periect.

Among the many treatises upon Gardening, general or special, a few may here be mentioned: Loudon's Encyclopadia of Gardening (1878); Loudon's Encyclopadia of Plants (Wooster's edition); Lindley's Vegetable Kingdom; Lindley's Botanical Register; Lindley's British Fruits; Vilmorin's Vegetable Garden; Sweet's British Flower-garden (7 vols.); Robinson's Flower-garden; Faul's Rose-book; Hibberd's Amateur's Greenhouses; Hogg's Fruit Manual (5th edition); Johnson's Gardener's Dictionary (Brown's edition); Barron's Vines and Vine-culture; Thompson's Gardener's Assistant; Cassell's Popular Gardening (4 vols.); Hemsley's Hardy Trees and Shrubs; Smith's Dictionary of Economic Plants.

Gardes Suisses. See Swiss Guards.

Gardiner, a town and port of Maine, on the Kennebee River, 56 miles NNE. of Portland by 1ail. Pop. 4439.

Gardiner, Colonel James, son of Captain Patrick Gardiner, was born at Carriden, in Linlithgowshire, January 11, 1688, and when only fourteen years old obtained a commission in a Scots regiment in the Dutch service. In 1702 he passed into the English army, and in 1706 was severely wounded at the battle of Ramillies. Gardiner fought with great distinction in all the other battles of Marlborough. In 1715 he was made first lieutenant, then captain of dragoons; and in the same year he gave a conspicuous proof of his courage, when, along with eleven other daring fellows (eight of whom were killed), he fired the barricades of the Highlanders at Preston. From an early period Gardiner was noted for his licentiousness; but in the year 1719 a vision of Christ on the cross transformed the brave but wicked soldier into a pions and exemplary Christian. In 1724 he was raised to the rank of major, and in 1726 he married Lady Frances Erskinc, dangliter of the fourth Earl of Buchan, by whom he had thirteen children, only five of whom survived him. In 1730 he became lieutenant-colonel of dragoons, and in 1743 colonel of the Enniskillens. Deserted by his dragoons at the battle of Prestonpans, fought close to his own house, he put himself at the head of a handful of infantry, and fought till, cut down with a Lochaber axe, he was borne to the manse of Tranent, where he died in a few hours, September 21, 1745. See his Life by Dr Doddridge (1747).

Gardiner, SAMUEL RAWSON, historian, was GAPAINET, SAMUEL HAWSON, Instorian, was born at Ropley, in Hampshire, March 4, 1829, and educated at Winchester and at Christ Church, Oxford, taking a first-class in 1851. For some years he filled the chair of Modern History at King's College, London, but resigned it in 1885 to continue his History at Oxford on an All Coulty land. his History at Oxford on an All Souls' elective fellowship. In 1882 he was granted a Civil List pension of \$150. The period to which he has devoted himself with a more than German patience and thoroughness of study, and a remarkably candid and unbiased openness of mind to the documents and the evidence of the time itself, is that of the first two Stuart kings of England. His work he first two Stuart kings of England. His work he gave to the world in the following instalments: The History of England from the Accession of James I, to the Disgrace of Chief-justice Coke (1863), Prince Charles and the Spanish Marriage (1869), England under the Duke of Buckingham and Charles I. (1875), The Personal Government of Charles I. (1877), and The Fall of the Monarchy of Charles I. (vols. i, and ii, 1882). The last was of course intended to extend to the death of the king, but in the first two volumes had only been brought down to 1642, when the whole of the preceding were grouped together and republished (1883-84) in ten volumes, as a continuous history of England from 1003 to 1612. Of the second half of his task, the History of the Civil War, he published the first volume in 1886, the War, he published the first volume in 1886, the second in 1889. Other works are The Thirty Years' War (1874) and The First Two Stuarts and the Paritan Revolution (1875) in Epochs of Modern History, and Introduction to the Study of English (1881), written in conjugation of English. History (1881), written in conjunction with Mr J. Bass Mullinger. For the Camden Society he edited the Fortescue Papers, the Hamilton Papers, the Parliamentary Debates in 1010, and Debates in the House of Commons in 1025,

Gardiner, Stephen, Bishop of Winchester, was born between 1483 and 1490 at Bury St Edmunds —a clothworker's son, say some; others, a natural son of Bishop Weedville of Salishnry. He studied at Trinity Hall, Cambridge, in 1520-21 proceeding doctor of civil and of canon law; and soon after, through the patronage of the Puke of Norfolk, he was introduced to Wolsey, who made him his secretary. In this capacity he won the confidence of Henry VIII., and by him was employed during 1527-33 in promoting at Rome and elsewhere his divorce from Catharine of Aragon. At this time he was known as Dr Stophens. He had become master of his old college in 1525, Archdeacon of Norfolk in 1529, and two years later of Loicester, when in November 1531 he was consecrated Bishop of Winchester. Good Catholic though he was, he supported the royal supremacy, and wrote a treatise in defence of it, *De verâ Obedientiâ* (1536). Still, he opposed all measures tending to a doctrinal reformation, he had a principal hand in the downfall of Thomas Cromwell, and the 'Six Articles' were largely of his framing, though the story that he lost Henry's favour by an attempt to impeach Catharine Parr of heresy is not based upon contemporary authority. On Edward VI's access temporary authority. On Edward VI's accession (1547), for refusing to comply with the new teaching he was committed to the Fleet prison, but released three weeks afterwards, to be next year again seized and lodged in the Tower, and in 1552 doprived of his hishapric. When in 1553 Mary ascended the throne, he was set at liberty, restored to his see, and appointed Lord High Chanceller of England. He new took the lead in the persecution of the Protestants, and has been charged with the grossest ernelty. Dr Maitland shows, however, that in very many instances the parties brought before his court were arraigned for treason rather than heresy; and certain it is that

he helped Peter Martyr to leave England, and interposed to protect Roger Ascham. He died very wealthy at Whitehall, of the gont, on 12th November 1555, and was buried in his cathedral. On his deathbed he cried out in Latin, 'I have denied with Peter, I have gone out with Peter; but I have not wept with Peter'—referring doubtless to his temporary renunciation of the papal supremacy. We have a dozen Latin and English treatises from his pen; but the Necessary Doctrine and Erudition of a Christian Man (1543) was probably Henry's own, not a joint production of Gardiner and Cranmer. Gardiner's character has been the subject of much debate; but it can scarcely be doubted that he was a zealous, though not a spiritually-minded, churchman. His devotion was that of an out-and-out partisan; but it was none the less real, for he would have laid down his life for the cause which commanded his sympathics. See the article by J. Bass Mullinger in vol. xx. of the Dict. Nat. Biog. (1889).

Gardner, a post-village of Massachusetts, 70 miles WNW. of Boston by rail, with manufactures of wooden wares—chairs, pails, tubs, and toys. Pop. (with South Cardner) 7283.

Garfield, James Abram, twenticth president of the United States, was born in Orange, Ohio, 19th November 1831. His father, who was descended from one of the Pmitan founders of Watertown, Massachusetts (1630), died soon after the boy's birth, leaving his wife, the daughter of a Huguenot family that had settled in New England in 1685, to bring up unaided her four small children, battling bravely with poverty and privation in her lonely cabin in the 'Wilderness' (now the 'Western Reserve') of Ohio. At the age of ten young Garfield already added something to his mother's income by work on the neighbouring farms; in winter he made steady progress in the district school. In 1849 he entered Geanga Seminary, at Chester, Olio; and in the summer months he turned to any and all kinds of work, to mouths he turned to any and all kinds of work, to provide funds for the ensuing winter. At this period Garfield joined the Campbellite body. He next passed on to the eollege at Hiram, Ohio, supporting himself meanwhile by tnition, and finally graduated at Williams College, Massachusetts, in 1856. Returning to Hiram, be became its president in 1857, at the same time preaching and studying law. He was elected to the state senate in 1859, and on the ontbreak of the war received the command of the 42d regiment of Ohio volunteers. In December 1861 he was given a brigade, with orders to drive the Confederates out of eastern Kentucky, and with reinforcements gained the battle of Middle Creek, 10th January 1862, from which his commission as brigadier-general was dated. He had been promoted major-general for gallantry at Chickamanga, September 19, 1863, when he resigned his command to enter congress, at the age of thirtyeommand to enter congress, at the age of thirtytwo. He sat in congress, at the age of unity-two. He sat in congress, rendering valuable assistance in military and financial questions, until 1880, and acted latterly as leader of the Republican party in the house. In January 1880 be was elected a United States sonator, and in June of the same year he was adopted as presi-dential cardidate by the Republican convention of dential candidate by the Republican convention at Chicago. Garfield's nomination came as a surprise to his party, and was simply the rosult of a compromise between the supporters of Grant and Blaine, after thirty-three ineffectual ballots had proved that neither could secure the prize. He proved, nevertheless, a strong candidate, regardless of precedent delivered speeches in his own behalf, and flually defeated General Hancock by a narrow majority on the popular vote, but by 215 to 155

electoral votes. He was inaugurated on 4th March 1881, and identified himself with the cause of civil service reform, whereby he irritated a powerful section of his own party (see Conkling). On the morning of 2d July, as he was setting off to witness the closing exercises of his old college, he was shot down from behind by a disappointed office-seeker, Charles Gniteau. For weeks he lingered between life and death; carly in September he was removed to Long Branch, New Jersey, and there he died, at Elberon, 19th September 1881. He was buried at Cleveland (q.v.). The vice-president, General Arthur (q.v.), succeeded him. Garfield held power long enough to show himself worthy of it. His tragic death has given him prominence in the roll of American presidents, but it was his brave and patient endmance of suffering that endeared him nost to his countrymen and claimed the sympathy and admiration of the rest of the world. His speeches were collected in 2 vols. (Boston, 1882). Popular memoirs are numerous; the most complete Life is that by J. R. Gilmore (New York, 1880).

Garcloch. See Dumbartonshire. Gar-fish. See Gar-pike.

Gar'gancy. See TEAL.

Gargano (ancient Garganus), a mountainous peninsula, the 'spur' of Italy, in the province of Foggia, jutting out some 30 miles into the Adriatic Sea, and attaining in Monte Calvo a height of 5110 feet. Bee-keeping is yet as generally engaged in as in the time of Horace. The district is visited mainly by pilgrims to a shrine of St Michael on Monte St Angelo.

Gargantua. See Rabelais. Gargarus. See Ida.

Gargle, or Gargarism, a class of medicines intended to be churned about in the throat, with a view of elecansing the parts, and of acting as antiseptics, Astringents (q.v.), sedatives, or Stimulants (q.v.), in various conditions of the throat. In using them a full breath is taken, the mouth filled with the liquid, and the head thrown back; as the breath is gradually allowed to escape, the liquid is freely brought into contact with the upper part of the throat. They are not generally suitable in eases of acute inflammation of the throat, but often valuable in chronic affections. Among the most usuable in chronic affections. Among the most usoful gargles are—Antiseptic: Condy's fluid, 10 to 20 drops; carbolic acid, 4 to 8 grains. Astringent: tannic acid, 10 grains; alum, 20 grains. Sedative: homide of potash, 20 grains. Stimulant: vinegar, 30 drops; diluted with a wineglassful of water.

Gargoyle, a projecting spout, leading tho water from the roof-gutters of buildings. Gargoyles of various forms have been used in almost all styles of architecture, but were peculiarly developed in connection with Gothic archi-

developed in connection with Gothic architecture. Some gargoyles are small and plain, others large and ornamental, according to their various positions. They are carved into all conceivable forms—angelic, human, and of the lower animals; and, as in fountains, the water is generally spouted through the mouth. In late castel-



St Stephen's, Vienna.

lated buildings, they frequently assume the form of small cannons projecting from the parapet. Gargoyles are generally carved in stone, but are sometimes executed in wood, and are made of great length so as to throw the water into the gutter formed in the middle of the streets of some





St Alkmund's Church, Derby; circa 1450.

Horsley Church, Derbyshire;

old towns. In modern times the use of leaden pipes to convey away the water from roofs has almost entirely superseded the use of gargoyles.

Garhmukhtesar, an ancient town in the North-west Provinces of India, on the Ganges, 26 miles SE. of Meernt, with four shrines dedicated to Ganga, and a great fair, which attracts 200,000 pilgrims. Pop. 7305.

Garhwal, a native state in the North-west Provinces of India, on the bonders of Tibot : area, about 4180 sq. m.; pop. (1881) 199,836. Also the name of a British district in the North-west Provinces, next to independent Garhwal: area, 5500 sq. m.; pop. 345,629. Being on the southern slope of the Himalayas, Garliwal is for the most part a nass of ringged mountain-ranges, whose elevation above the sea reaches in Nanda Devi 25,601 feet. The native state is the cradle of both the Junna and the Ganges, and in the district are the Alaknanda and its point of junction with the Bhaginald of the state of the control of rathi (see GANGES); consequently, in spite of the length and ruggedness of the way, crowds of pilguins are attracted to the peculiarly sacred localities of Deoprayag and Gangotri.

Garibaldi, Giuseppe, the Italian patriot, was born at Nice on the 4th July 1807. His father was a simple, God-fearing fisherman, seldom in prosperous circumstances, but he contrived nevertheless to give the boy a tolerable education, possibly with the object of making him a priest. Gauseppe, however, was determined upon becoming a sailor, and rising rapidly in the merchant-service, he was appointed in 1828 second in command of the brig Cortess. His early voyages, which included a visit to Rome, filled him with democratic ardom, whence it is only natural that in 1834 he should have been involved in the 'Young Italy' movement of Mazzini, whom he met at Marseilles, and should have been whom he het at Masernes, and should have been condemned to death for taking part in an attempt to seize Genoa. He had volunteered for the royal navy with the object of gaining recruits for the cause. Garibaldi escaped to Marseilles and afterwards to South America, where he offered his are wards to South America, where he offered his services to the province of Rio Grande, which was in rebellion against the Emperor of Brazil. He distinguished himself as a gnerilla warrior and privateer, was taken prisoner and suspended for two hours by the wrists for attempting to escape, and eloped with and soon married the beautiful ereole Anita Riveira de Silva, the companion of his carlier campaigns and the mother of his children Menotti. Ricciotti, and Teresa. After some mingled experiences as drover, shipbroker, and teacher of mathematics, he offered in 1842 his assistance to the Montevideans, who were at war with Rosas, the tyrant of Buenos Ayres. In this struggle Garibaldi won fresh renown, by water as naval commander in a two days' engagement, and on land as organiser and commander of the Italian legion, especially on 8th February and 20th May 1846, when he beat off considerably superior forces of

when he beat off considerably superior forces of the enemy at Salto San Antonio and the Dayman River. He gives a full account of his various exploits in his autobiography.

The 'red shirt' of Ganibaldi had thus already be-come famons, when in 1847 the reforming pope, Pins IX., ascended the throne of St Peter. Garibaldi, the Montevidean struggle being practically at an end, promptly offered to enlist under his banner, but received an ambignous reply; and Charles Albert of Sardinia, whom on his arrival in Italy in Juno 1848 he found besieging the Anstrians in Mantna, coldly referred him to his ministers. Garibaldi, however, after the collapse of the Italian army, at the head of a body of volunteers performed some the head of a body of volunteers performed some notable feats against the Austrians on the Swiss frontier, and then wandered about Italy until he reached Ravenna. In 1849 he threw in his lot with the revolutionary government of Rome against Pins IX., who had retracted his liberal concessions and fled the city. Garibaldi, indeed, voted for the proclamation of the republic in February, drave the French expeditionary force under Oudinot from the Rome. For Paparentic in April and control the Porta San Pancrazio in April, and ronted the Neapolitans at Palestrina and Velleti in May, sending them pell-mell over the frontier. Mean-time, however, Mazzini had been inveigled by Mean-Ondinot into an armistice; and, being abundantly reinforced, the French praceeded to lay siege to Rome. Garibaldi was rocalled, unch to his disgust. He was refused the dictatorship on June 2, and on July 3, after a brilliant defence, he was forced to abundon his post. Ho retreated, pursued by the Austrians, to the Adriatic, where poor Anita, worn Anstrians, to the Adritte, where poor Ainti, worn out by suffering and anxiety, died, and was huried in the sand. Garibaldi was at length arrested by the orders of the Sardinian government at Chiavari, and requested to leave Italy, much to the indignation of the people. He betook himself to Staten Island, New York, where he worked for eighteen months as a candlemaker, then became captain castle, where he declined a popular demonstration.

He returned to Italy in 1854, and had settled down as a farmer on the island of Caprera, when in

1859 the outbreak of the war of Italian liberation called him to arms once more. He was summoned to Turin by Cavour in Pelruary, and at once placed his sword at the disposal of Victor Emmanuel. Though frequently thwarted by the Sardinian generals, Garibaldi and his 'classeurs of the Alps' rendered valuable service to the allies, especially at Varese in the Valtelline (May 25). After the peace of Villafranca, Garibaldi, with the permission of Victor Emmanuol, went into central Italy as second in command, and helped to consummate the amexation of the territories to Sardinia, but was not allowed as he desired to marel on Rome. He was cut to the quick when his native Nice was handed over to France, and declaimed against Cavour in the chamber at Turin. Meanwhile the Mazzinists had been busily conspiring against the offete Bourbon tyranny in the Two Sicilies, and Garibaldi, in spite of Cavour's efforts to prevent him, prepared to came to the rescue. The enterprise appeared dangerous in the extreme; but, as the English cabinet insisted on the neutrality of France, the Bourbons could look for no foreign assistance, and 'the thousand heroes' on landing at Marsala on May 11 met but a feeble enomy. With the exception of the garrison of Milazzo, which capitalated after a battle on permission of Victor Emmanuel, went into central of Milazzo, which capitalated after a battle on July 24, the disaffected troops of Francis II. fought half-heartedly enough, and within three months Sicily was free. Promptly crossing the straits (August 29) Garibaldi began his military

promenade through Naples, and entered the capital (September 7) amid the cheers of King Francis' troops. After a last stand on the Volturuo on October 1, the Bonvbons took refuge in the citadel of Gaeta. Then Victor Emmannel, having been elected sovereign of the Two Sicilies by a plebiseite, arrived at Naples, and Garibaldi, refusing all reward, resigned his dietatorship and retired to Caprera. His conduct entailed a quarrel with the Republican party, and he was besides disgusted by the refusal of the Italian ministry to enrol his veterans in the regular army, and at not being allowed to march on Rome and destroy the hated papal government. In this he saw the hand of Cavour, but later publications show that he was mistaken as far as the volunteers were concerned.

During the ensing years Rome was the centre of his thoughts, though shared with schemes for stirring up rebollion in Hungary, and so causing the Austrians to withdraw from Venice, and in 1862 he embarked on a rash expedition against the capital. If the king and the weak Rathazi calinet did not actually egg him on, as Garibaldi said they did, they at all events sat still and allowed him to compromise himself, and then sent troops against him, by whom Garibaldi was taken prisoner at Aspromente after he had given orders to his troops not to fire (Angust 28). Badly wounded in the foot, Garibaldi was detained for two months as prisoner at Spezzia, and was then allowed to return to Caprera. He next paid a visit to England to induce the government to esponse the cause of Dennark, and was received with the wildest enthusiasm; but failing to effect the object of his journey, he returned abruptly home at the request of the cabinet. In the war of 1866 he once more commanded the 'Red Shirts' in the Tyrol, but, though his sons Meuotti and Ricciotti proved worthy of their father, the eam-paign as a whole was not marked by very brilliant Garibaldi accused the government of neglecting to forward men and arms, and their conduct seems to have been marked by unworthy suspicious. Venice was now ceded to Italy, but Rome still remained unredeemed, and, untaught by his previous adventures, Garibaldi in the following year made his last attempt on the Holy City. Arrested on September 22 by the Italian government—whose hands were tied by the convention with France of 1864—he escaped from Caprera in a boat, and placing himself at the head of the volunteers, defeated the papal troops on October 25 at Monterotondo. On November 3, however, the Zonaves, reinforced by a body of French armed with the deadly chassepot, utterly rented him at Mentana. Once more he was allowed to retire to Caprera, whence in 1870 he sent for publication two novels, entitled Cantoni il voluntario and Clelia, ovvero il Governo del Monaço. The latter has lecting to forward men and arms, and their conduct Clelia, ovvero il Governo del Monaco. The latter has been translated into English under the title of the 'Rule of the Monk,' but it must be confessed that Garibaldi did not shine as an author, and that the average schoolboy could write as well. In 1872, however, he published a third remance, Il Mille, based on the events of the Sicilian expedition. In 1870, though at first a sympathiser with Germany, owing to his hatred of Napoleon III., he resolved to come to the assistance of the French Republic. come to the assistance of the French Republic, Gambetta did not receive him with much enthusiasm, but eventually placed him in command of the volunteers of the Vosges, Bally crippled by rhenmatism, however, and hopelessly outnumbered, he confined his movements to the neighbourhood of Dijon and Autum. Even so his troops distinguished themselves, especially on 20th January 1871, when Ricciotti heat off a body of January 1871, when Ricciotti heat off a body of Prussian Pomoranians near Dijon. The Prussian general, Manteuffel, has left a favourable estimato

of his tactics during the campaign. Garibaldi was elected to the Assembly at Bordeaux by Dijon, Nice, and Paris, but, as a foreigner, was not allowed to address the deputies.

During the remainder of his life he remained a helpless invalid at Caprera, except on occasions like that in 1874, when he took his seat in the Chamber of Deputies at Rome; and through the generosity of his English friends he became entire proprietor of the island. In 1880 the marriage into which he had been entrapped by an adventuress as far back as 1859 was annulled, and he was promptly united to Francesea, his peasant-companion, who had originally come to the island as nurse to the children of his daughter Teresa, the wife of Stefano Canzio, one of his officers. During the last years of his life manifestoes poured from his pen, in which professions of dovotion to the Sardinian dynasty alternated with the widest republicanism; and his atternated with the whitest republicanism; and his simplicity, like that of Victor Hugo, was easily persuaded to endorse any document containing the commonplaces of cosmopolitanism. But he was ever constant to the ideal of his youth, the unity of the Italian-speaking race. Thence came his participation in the 'Irridentist' agitation; thence practical was his advocacy of the papacy. More practical was his advocacy of the creation of a mercantile navy and the reorganisation of the army, and his interest in the drainage of the Campagna and the diversion of the Tiber; but Campagna and the diversion of the Tiber; but the last project had no adequate result. His religious views latterly embraced a somewhat clementary pantheism; 'God did not make man,' he wrote, 'but man mado God,' and death ho looked upon as a transmutation of matter. On 2d June 1882 he died, and was sincerely mounted, not only by his fellow-countrymen, but by the lovers of liberty throughout Enrupe. For than a good commander of irregulars, and though his irrogrance of political considerations sometimes his ignorance of political considerations sometimes did actual harm to the cause he advocated, yet it would be impossible to overrate the importance to Italian unity of his whole-souled devotion to his country, a devotion which he communicated to all with whom he came in contact. He will always remain the central figure in the story of Italian indopendence.

Garibaldi's autobiography was published in 1887, and an English translation with a supplementary biography by Mne. Mario in 1889. The best general sketches of Garibaldi are te be found in J. T. Bent's Life of Garibaldi, and in Mne. Mario's Garibaldi c i suoi Tempi (Milan, 1884). Elpis Melenn's Garibaldi (2 vols. Hanover, 1884) is also incidentally instructive. Garibaldi's speeches were published in 1882, and his letters, edited by E. E. Ximenes, un 1885.

Gariep. Sec ORANGE RIVER.

Garigliano (ancient Livis; in its upper course now called Liri), a river of southern Italy, rises in the Abruzzi, west of the former Lake of Fucino, and flows, after a generally southerly course of 90 miles, into the Gulf of Gaota. It is navigable below Pontecorvo, and abounds with fish. On its banks in 1503 was fought a famous battle between the French and the Spaniards, commanded by Gonsalvo de Cordova, in which the former were totally ranted, though Bayard is said single-handed to have held the bridge against 200 Spaniards.

Garlic (Allium satium, see Allium), an herb cultivated from the earliest ages on account of its wholesome and characteristically flavoured bulbs. These break readily up into a dozen or more 'cloves' or subordinate bulbs, which are the developed axillary buds of the exhausted scale-leaves of the parent bulb; and this circumstance is of unch sorvice, alike in cultivation and in regulating

the quantity used in cooking. This varies



Common Garlic (Allium sativum).

with national taste, from a maximum in Spain to a minimum in Britain. The plant seems to have been introduced along the Mediterranean from the East in very carly times, its original home being per-lups the Kirghiz steppes: it is recorded as part of the rations of the Egyppyramid-builders, and there perhaps the Jews acquired their fondness for it. It was, however, forbidden to the priests of Isis. The priests of Isis. Roman soldiers were given garlie as an excitant (whence the peace-loving maxim, allium no comedas); and the same regimen was applied in the still recent days of cock-fighting. It had cock-fighting. also many medicinal applications.—Many of the species of Allium are popularly called garlic, with some distinctive

addition. A. oleraceum is sometimes called Wild Garlic in England, and its young and tender leaves are used as a pot-lierb.

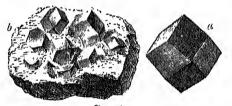
Garlic, OIL of. When the leaves, seeds, or bulbs of garlic and other allied plants are distilled When the leaves, sccds, or with steam, about 0'2 per cent. of a brown oil, with acrid taste and strong disagreeable odour, passes over. By purification it is obtained as a pale yellow oil having the odour of garlic, and it is then found to consist of the sulphide of allyl, (C₃H₅).S. This oil is nearly related to the pungent oil of mustard, C₃H₅NCS, an isomer of the sulphocyanide of allyl, and is of much interest chemically, but it is of no impertance from an industrial or popular point of

Garnet, HENRY, is chiefly remembered for his connection with the Gunpowder Plot. He was born in 1555, and educated as a Protestant at Winchester College. A few years after leaving school he became a Roman Catholic, went abroad, and entered the Society of Jesus. He acquired among the Jesuits a considerable reputation for learning and piety. In 1586 he was sent upon the English mission, where for eighteen years he acted as provincial of the Jesuits. The indiscreet zeal with which he promoted certain Jesuit schemes for the advancement of their order brought him into odium with an influential section of the secular clergy; while his friendship and correspondence with the extreme partisans of the Spanish faction brought him under suspicion of treason. In the spring of 1605 he wrote to a Jesuit in Flauders in commendation of Guy Fawkes, when that conspirator went over to the Netherlands in order to solicit the over to the Netherlands in order to solicit the co-operation of Sir William Stanley and others in the plot of that year. Garnet admitted that before this he had come to know, in a general way, of tho projected treason, and that in July he heard the particulars, under the seal of confession (so he said), from another Jesnit, Greenway. At the time of the discovery of the plot he was present at the place of meeting appointed by the conspirators, and shortly afterwards was apprehended on suspicion at Hendlip. The chief grounds for inferring his complicity in the plot were derived from a secret conversation held by him in prison with a brother Jesuit, Oldcorn, overheard by

spies set for the purpose by the government.

That Garnet knew the particulars of the murderons design months before its attempted execution was proved and admitted. That this knowledge was derived oxclusively from the confessional rests upon his statement only. It would probably have gone less hard with the prisoner had not his judges been prejudiced against him, not indeed so much on account of his creed as for his extraor-dinary practice of equivocation when on his trial, dinary practice of equivocation when on his trial. He was condemned for misprision of treason, and executed May 3, 1606. In proof of his innocence the story of a miraculous straw, touched by his blood, and boaring a miniature perhait of the Jesnit, was circulated among Roman Catholics; and it is said that the mere sight of the straw made five hundred converts to his creed. Garnet was considered by his correliabilities generally a considered by his correliabilities generally as a was considered by his co-religionists generally as a martyr for the scal of confession, and as such was proposed, with the rest of the victims of the penal laws, for the honom of beatification; but it is remarkable that, while more than three hundred enadidates obtained the title of Blessed or Venerable, the objections of the 'devil's advocate' in the case of Father Garnet were so cogent that the pope was induced to defer the introduction of his cause. See Gunpowder Plot, and works cited

Garnets, a group of minerals that crystallise in the culical system. Their commonest form is the rhombic dodecaliedron, or a combination of this with the icositetrahedron. Their composition may where M = Ca, Fe, Mg, Mn; $R_2 = Al_0$, Fe, Cl₂. Thus we have limo-alumina, iron-alumina, magnesiaalumina, manganese-alumina, lime-iron, and limechrome garnets. Garnots have a hardness ranging



Garnot: a, a detached crystal; b, portion of rock with embedded crystals.

from about 7 to 8. Their lustre is vitreous very seldom colourless. The most common colour is some shade of red, but brown, yellow, green, and even black varieties are known. Some of the botter known kinds are as follows:

Lime-alumina Garnets.—Grossular (grossula, 'a gooseberry'), so called from its green colour—tho tint is usually rather pale—found in Siberia and in Norway; Essonite or Cinnamon-stone (q.v.); Succinite, amber-coloured, from Ala, Piodmont; Romanzovite, brown or brownish-black, from Kimito, in Finland.

Iron-alumina Garnets.—Almandine, the previous or oriental garnet of jewellers; red, transparent; occurs as a rock-constituent in many crystalline schists and granites, and occasionally also in trachyte, and is met with in the sands and alluvial soils which have resulted from the disintegration of such rocks, as in Ceylon, Pegu, Hindustan, Brazil, Greenland, Scotland, &c. Iron-alumina garnets are often crowded with enclosures, have a somewhat dull lustre, and are full of flaws; such are usually known as common garnet. Common garnet often occurs massive, and not infrequently

forms a very considerable part of certain kinds of

rock, as garnet-rock, eklogite, and granulite.

Magnesia-alumina Garnets.—These are somewhat
uncommon—the best known being the black garnets from Arendal in Norway. Another is Pyrope, which is transparent and of a blood-red colour. Carbuncle is transparent and of a blood-red colour. (q.v.) is the name given by lapidaries to a pyrope cut en cabochon or 'tallow-drop.' It occurs in serpentine and in the loose soils derived from the breaking-up of that rock, as in Bohemia, where it is used as a gem. It does not occur in crystals, but in rounded or angular grains.

Manganese-alumina Garnets are met with, chiefly

in small grains and crystals in schists and granites, near Aschaffenburg, in Spessart (Franconia); in the Ardennes, Piedmont, Connecticut, &c. The Franconian locality has given its name to this garnet—Spessartine, which is of a deep hyacinth or brownish-red. Many of the garnets which occur in the granites of Scotland are rich in magnesia, but from the abundance of ferric oxide which they contain they are included under the iron-alumina

Lime-iron Garnets.—Of these the most important is Melanite, velvet-black and opaque; it occurs as a rock-constituent in various volcanie rocks (phonolite, lencite-lava, and tuff), as at Frascati (Albano Mountains, near Rome), Laacher See, near the Rhine, Oborbergen (Kaiscrstuhl), &c. Other varieties are Topazolite, yellow, green, and greenish-yellow; Aplone, green, brownish, and sometimes

Lime-chrome Garnets. - Uwarowite, an emeraldreen garnet, translucent at the edges, found in

the Urals.

The garnets of commerce are brought from Bohemia, Ceylon, Pegn, and Brazil; the most esteemed kinds (coming originally from Syriam, in Pegn) are vulgarly called Syriam garnets. They are violet-purple; and now and again very fine specimens almost vio in colour with the oriental amethyst. The stones vary in size from the smallest that can be worked to the size of a hazel-nut. Larger ones are common enough, but these are rarely free from flaws or impurities. rarely free from flaws or impurities.

Garnett, Richard, philologist, was born at Otley, in Yorkshire, in 1789. Ho had already tried communes and the church, when in 1838 he found his work in the appointment of assistant-keeper of printed books at the British Museum. He died in 1850. One of the founders of the Philological 1850. One of the founders of the Philological Society, he contributed many striking papers (on Celtie subjects, largely) to its *Proceedings* and to the *Quarterly Review*. These were collected by his son in *Philological Essays* (1859).—RICHARD, his son, was horn at Lichfold, February 27, 1835, and appointed in 1851 assistant in the printed book department of the British Museum, where also he became superintendent of the where also he became superintendent of the reading-room in 1875. This office he resigned in 1884 to devote himself more exclusively to the printing of the Museum Catalogue, of which he had had charge from its commencement. He received the degree of U.S. D. from Edinburgh in received the degree of LL.D. from Edinburgh in 1883. Dr Garnett has published three volumes of rerse; Relies of Shelley (1862), Selections of Shelley's Poems (1880) and Letters (1882); and De Quincey's English Opium Eater (1885). Ho has also achieved the rare feat of a sensible little book on Carlyle (1883), and published a volume of prose tales, The Twilight of the Gods (1888). His pen has been busy also in contribution to macaying and appealmenting also in contributing to magazines and encyclopædias.

Garnier, Francis, sailor and traveller, was born at St Etienne, 25th July 1839, and entoring the navy fought in the Chinese war (1860-62). Appointed to a post in French Cochin-China, he promoted a great exploring expedition, of which

he ultimately assumed the command. from the coast of Cambodia (q.v.), the expedition travelled to Shanghai by way of Yunnan. He took part in the defence of Paris in 1870-71, and subsequently travelled again in China. In the Tonkin war he took Hanoi, but was killed, 2d December 1873. His chief work is Voyage d'Exploration en Indo-Chine (2 vols. 1873). See Petit's Francis Garnier (Paris, 1885).

Garnier, Robert (1534-90), a French trage-dian, the most distinguished of the predecessors of Corneille (see Drama). Editions of his plays have appeared at Paris (1607), Ronen (1618), and Heil-

bronn (1883).

Garnier-Pages, ETIENNE JOSEPH LOUIS, was born at Marseilles, 27th December 1801, and practised there as an advocate, but at Paris in 1830 took a conspicuous part in the July revolution, and in 1831 became a prominent member of the Chamber. He died 23d June 1841.—His halfbrother, Louis Antoine, born 16th July 1803, also shared in the July revolution, and succeeded his He became in 1848 mayor of Paris and finance-minister of the provisional government, was a republican member of the Corps Legislatif in 1864; and was a member of the provisional government of 1871. He died in Paris, 31st October 1878. He wrote the Histoire de la Revolution de 1848 (1861-62), and L'Opposition et l'Empire (1872).

Garnishee. In English law, to garnish (Fr. garnir) is to warn, and the garnishee is a person warned not to pay money which he owes to another, because the latter is indebted to the garnisher who gives the warning. See ATTACHMENT.

Garo Hills, a mountainous district forming the south west corner of Assam, with an area of 3146 sq. m., and a pop. (1881, partly estimated) of 109,548. The hills, low in the north, rise to 4650 feet in the Tura range, which is the source of several tributaries of the Brahmaputra, and constitutes an important watershed; the average rainfall here is over 126 inches. The district was first placed under separate administration in 1866.

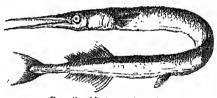
Garonne (anc. Garumna), the principal river in the south-west of France, rises within the Spanish Maladetta, in the Pyrenecs, 6142 feet above sea-level. About 26 miles from its source it enters the Prench territory in the department of Haute Garonne, flows in a general north-cast course to Toulouse, then bends to the north-west, and con-Toulouse, then hends to the north-west, and continues to flow in that direction until, joined by the Dordogne, about 20 miles below Bordeaux, and widening afterwards into the estnary which bears the name of the Gironde, it enters the Atlantic at the Pointe do Grave. The estnary, the largest in France, is nearly 50 miles long. Tho total length of the river is about 346 miles; it drains an area of some 22,020 sq. m. Its navigation, which, however, is much impeded above Toulouse, commences for small craft at Cazères; ocean steamers go up to Bordeaux. Its principal affluents are the Tarn, Lot, and Dordogne, on the right; and on the left, Lot, and Dordogne, on the right; and on the left, the Save, Gors, and Baise. At Toulouse it is joined by the Canal du Midi, which, running castward to the Mediterranean, forms with the Garonne a many of companying tion between that see and the means of communication between that sea and the Atlantie; and the river's own canal lateral, starting also from Tonlonse, runs along the right bank, receives the Montauban Canal, and spans several streams in its course, crossing the Garonne itself at Agon by a magnificent viaduct, and returning to the river at Castets, after a total length of 120 miles. The valley of the Garonne is noted for the because of its account is lightly to description. boauty of its scenery, but is liable to destructive inundations, the most memorable being that of

1875, when damage to the amount of 85 million francs was caused.

Garonne, HAUTE, a department in the south of France, embracing portions of ancient Gascony and Languedoe, has an area of 2428 sq. in., and a pop. (1872) of 479,362; (1886) 481,169. It is watered throughout by the Garonne, from which it derives its name, and within the basin of which it wholly lies. Occapied in the south by a branch of the Pyrenean range, the slope of the department and the course of its streams are toward the north and north-east. Apart from this southern mountainous region, the department is hilly and fertile. The soil in the valleys is remarkably productive, and bears heavy crops of wheat, maize, flax, hemp, potatoes, and rape-seed. Orehard fruits and chestpotatoes, and rape-seed. Oreintal rings and the soruts are produced in abundance, and the anunal yield of wine is about 20,000,000 gallons, two-thirds of which is exported. Mineral springs and haths are very pleubial. The chief manafactures are woollen and cotton fabrics, paper, and hardware. The department is divided into the four arrondissements of Toulouse, Muret, St Gandens, and Villefranche, with Toulouse as capital.

Garotte. See GARROTTE.

Gar-pike (Belone), a genus of bony fishes in the family Scombresocide, not far from the true pikes (Esocide). They have long bodies, and both pikes (Esocidæ). They have long bodies, and both jaws are prolonged into a slender beak, beset with roughnesses and widely set teeth. They swinn actively, with an undulating motion, near the surface, and catch small fishes in their jaws. The common Gar-pike (B. vulgaris or B. belone) is frequent off British coasts, and is sometimes called Greenbone, from the colour of the bones (especially after cooking), Gorebill, from its characteristic beak, or Mackerel-guide, because it visits



Gar-pike (Belone vulyaris).

the coasts just before the mackerel. It is usually about two feet in length, is often brought to the London market, and forms a wholesome dish, in flavour somewhat like mackerel. About fifty species are known from tropical and temperate seas, some twice as long as the British species. The young forms have at first jaws of a normal size, and in growth the lower outstrips the upper. The name Gar-pike is sometimes applied to the far-removed Ganoid-Lepidosteus, or Bony Pike (q.v.).

Garrett, Elizabeth. See Anderson.

Garrick, David, actor, manager, and dramatist, was born on 20th February 1717, at Hereford, where his father, Captain Peter Garrick, was then stationed. Lichfield, however, was the home of the Garricks, and it was in the grammar-school there that David received the chief part of his education, for he must have been in his nineteenth or twentieth year before he was sent to study or twentieth year before he was sent to study or twentieth year before he was sent to study Latin and Greek under Samuel Johnson, at Edial near Lichfield. His tuition by Johnson lasted for only a few months, and its well-known result was the setting out of master and pupil together, on the morning of 2d March 1737, to journey to London; Garrick to study 'mathematics, and philosophy, and humane learning,' with a view to the bar; Johnson 'to try his fate with a

tragedy, and to see to get himself employed in some translation, either from the Latin or the French.' But circumstances brought Garrick's legal studies to nothing, and in 1738 he became a wine-merchant, in partnership with his cliest brother, Peter. Samuel Foote in after yoars used to say that 'he remembered Garrick living in Durham Yard, with three quarts of vinegar in the cellar, calling himself a wine-merchant.' Garrick, there is no doubt, already had the stage representation of the street of the stage of the street of in the summer of 1741 made his first appearance as an actor. He did not venture at once to play in London, but went through a short probationary season at Ipswich, playing under the name of Lyddal. His first part was Aboan in Southerne's Oromoko, which he chose because Aboan's black face disgnised him and gave him greater confidence. He subsequently played with great success several other parts, including Harle-quin. On 19th October 1741 he appeared in London at the theatre in Goodman's Fields, of which his friend Gillard was manager. Richard III. was his first charactor, and his success was so great that within a few weeks the two patent theatres were deserted, and crowds flocked Goodman's Fields had no license, so the managers of Drary Lane and Covent Garden set the law in motion and had the thertre closed. Garrick in motion and had the theatre closed. Garrick played at both the patent theatres, but ultimately settled at Drury Lane, of which he became joint-patentee with James Laey in 1747. Until 1776 he continued to direct the leading theatre, and in that year he retired from the stage and from management, his successor in the direction of the theatre being Richard Brinsley Sheridan. During this period Charrick was himself the great attraction and played continually, his only long rest being a trip to the Continent from 1763 to 1765, at which time he fancied that his popularity was in danger of diminishing. His farewell appearance was made on 10th June 1776, when was in danger of diminishing. His forewell appearance was made on 10th June 1776, when he played Don Felix in the councy of The Wonder. He died on 20th January 1779, and was buried in Westminster Abbey, where a hideously theatrical monument was erected to his memory. As an actor, Garrick occupies the first rank. At his coming the stage was given over to formality and tradition, but these disappeared before the new actor whose leading characteristic was naturalness. He nossessed also the most extensivity was naturalness. actor whose leading characteristic was naturalness. He possessed also the most astonishing versatility, being equally at home in tragedy, comedy, or farce—in Lear, Don Felix, or Abel Drugger. As a man, he has heen charged with meanness, vanity, and petty jealousy; but his faults of character were grossly exaggerated by those who envied his fame, and they were more than balanced by his many excellent qualities. Garrick's dramatic productions, some forty in number, are of minor importance, but some of his numerous prologues and epilognes are excellent. Garrick married in June 1749 a good and excellent. Garrick married in June 1749 a good and excellent woman, Eva Maria Violette, the celebrated dancer. She long survived him, dying in 1822, at the great age of ninety-seven. See Percy Fitzgevald's Life of David Garrick (2 vols. 1868).

Garrison, WILLIAM LLOYD, journalist and teatrison, William LLOYD, journams and abolitionist, was born at Newhuryport, Massachusetts, December 10, 1805. His father was a man of literary taste and ability, but, falling into dissolute habits, described his wife, who, to support her family, had to turn professional nurse. William, who had wereberk ind shown him and columns. who had previously tried shoomaking and cabinet-

making, was apprenticed to the printer of the Newburyport Herald, an occupation which snited his taste; he soon made himself master of the mechanical part of the husiness, and when only sixteen or seventeen began to write for the Herald. His contributions, which were anonymons, were favourably received, and he soon commenced to send articles to the Salom Gazette and other papers, send articles to the Salom Gazette and other papers, drawing the attention of political circles by a series of articles under the signature Aristides, with the view of removing the almost universal apathy on the subject of slavery. In 1824 he became editor of the Herald, and some of J. G. Whittier's carliest poems were accepted by him, while their anthor was yet unknown to fame. After two or three other attempts, in 1829 he joined Mr Lundy at Baltimore in editing the Genius of Universal Emancipation. The vigorous expression of his anti-slavery views in this last paper led to his imprisonment for libel, from which he was released by Mr Tappan, a New York merchant, who paid his fine. He now prepared a series of emancipation lectures, subsequently delivered in New York and other places. He returned to Boston, and in 1831 started the He returned to Boston, and in 1831 started the Liberator, without capital or subscribers, a paper with which his name is inseparably associated, and which he carried on for thirty-live years, until slavery was abolished in the United States. For the first few years the mail brought hundreds of letters to Christer these two the properties. letters to Garrison, threatening his assassination if he did not discontinue this journal; the legis-lature of Georgia offered a reward of 5000 dollars to any one who should prosecute and bring him to conviction in accordance with the laws of that state; in 1835 he was severely handled by a Boston mob, and the mayor of that city was constantly appealed to from the South to suppress his paper. In spite of all, he successfully persevered. In 1833 he visited Great Britain, and on his return organised the American Auti-slavery Society, of which he was afterwards president. He visited England again, in the furtherance of his anti-slavery opinions, in 1846 and 1848. The diverging views of the anti-slavery party, as to whether a political platform should be adopted, and as to the voting and speaking of women, reut the body for a time, but on 1st January 1863 Lincoln's proclamation of freedom to the slaves as a military measure placed the civil struggle on an anti-slavery basis. In 1865, when Garrison's labours had been completely successful, and after the total abolition of slavery in the United States, his friends presented him with 30,000 dollars (£6000) as a memorial of his services. In 1867 he was once more in England, and enter-Hained at a public breakfast in St Janes's Hall. He died at New York, 24th May 1879. A bronze statue has been creeted to his memory in Boston. Some Sonnets and other Poems by him were published in 1847, and Selections from his Writings and Speeches in 1852. See Johnson's William Lloyd Gurrison (1882); William Lloyd Garrison: the Story of his Life, by his children (4 vols. 1885-89); and poems to his momory by both Whittier and Lowell.

Garrot, a name applied to various ducks—e.g. to Fulix clangula and Hurelda histrionica. See WILD-DUCK.

Garrotte (Span. garrote, 'a stick or endgel'), a modo of execution practised in Spain and the Spanish colonies. Originally it consisted in simply placing a cord round the neck of a criminal, who was scated on a chair fixed to a post, and then twisting the cord by means of a stick (whence the name) inserted between the post and the back of the neck, till strangulation was produced. Afterwards a brass collar was used, containing a serow, which

the excentioner turned till its point entered the spinal marrow where it unites with the brain, cansing instantaneous death. In its primitive form it exactly resembles the punishment of the bowstring in use among Mohammedan nations.—Garrotting is also the name given in Britain to a species of robbery which became rather common in the winter of 1862-63, and in which the robbers suddenly come behind their victim, and half-strangle him till their purpose is effected. An act passed in 1863 imposing Flogging (q.v.) as part of the penalty was effective in speedily suppressing the offence.

the offence.

Garter, The Most Noble Order of The. This renowned order of knighthood was instituted by King Edward III., at what exact date has been matter of dispute, but most probably on 18th January 1844. Edward, having laid claim to the French throne, assumed the style of king of France. He had been partially successful in his first French campaign, and, meditating a second expedition, he resolved to institute an order of knighthood in honour of his successes past and to come, and as a means of rewarding some of his most distinguished comrades in arms. Hence the colour of the emblem chosen was blue, the French livery colour, and the motto, Honi soit qui mal y pense (i.e. 'Dishonoured be he who thinks ill of it'), was appropriate whether it applied to the French expedition or to the order itself. The tradition is that the choice of both emblem and motto was determined by a trivial incident. The Countess of Salisbury dropped her garter when dancing with the king, and the king, pleking it up, tied it round his leg; but, observing the queen's jealons glances, he returned it to its fair owner with the remark, Honi soit qui mal y pense. The order was originally founded in honour of the Holy Trinity, the Virgin Mary, St George of Cappadocia, and St Edward the Confessor; but St George was always accounted its especial patron, so much that it has sometimes been called the 'Order of St George.' By the original constitution the Knights Companious were to be twenty-five in number exclusive of the sovereign, and were to assemble yearly on the eve of St George in St George's Chapel, where each was assigned a stall. Subsequent statutes authorised the admission into the order, in addition to the twenty-five companions, of foreigners of distinction, and such descendants of George II. (extended to descendants of George II. in 1831) as should be elected, always excepting the Prince of Wales, who was of necessity a companion; also of extra knights, which last, however, have always, on vacancies occurring, been incorporated int

The habits and ensigns of the order originally consisted of the garter, surcoat, mantle, and hood, to which were afterwards added the collar and George, the star, and the under habit.

This order has, unlike all others, for its principal emblem neither chain nor hadge, but the garter, which, at first of light-blue silk with the motto sometimes set in pearls, rubics, and diamonds, is now of dark-blne velvet about an inch wide, with the motto in gold letters. It is worn on the loft leg a little below the knee; and when the sovereign is a queen, she wears it, as sovereign of the order, on the left arm above the elbow. The statutes forbade the companions to appear in public without it, yet in the elligies on their monuments it is often wanting. The practice of surrounding the armorial insignia of the companions with the garter began in the reign of Henry V.; and the first sovereign on whose tomb this usage was complied with was Henry VII. An embroidered garter with the motto of the order seems to have been formerly worn on the left arm of the wives of companions.

The manifold variations in the colour, form, and material of the mantle, surcoat, and under habit at different times need not be described here. As at present worn, the mantle is of purple velvet lined with white taffeta, having on the left shoulder the badge of the order, namely, a silver escutcheon charged with a red cross for the arms of St George, and encircled with the garter and motto, as in the annexed cut. In chapters it is worn over the uniform or court dress. The surcoat, a short gown without sleeves, is made of crimson velvet lined like the mantle with white taffeta. The hood, worn on the right shoulder of the mantle, and now a meaningless appendage, is made of the same velvet as the surcoat, and similarly lined. When it ceased to serve its original purpose of a covering for the head, a cap was introduced in its place, which is now ornamented with ostrich-feathers, and in the centre of them a lofty tuft of black heron's feathers, the whole attached to the hat by a clasp of diamonds.



Order of the Garter: Star, Collar and George, and Garter.

The under habit, introduced by Charles II., need not be described in detail, and the costume is completed by white silk hose and white shoes and red heels. The garter worn on the right leg is of white silver riband with a large silver rosette. The sword is straight, of an ancient pattern with a cross-guard hilt, all gilt, the scabbard of crimson velvet.

The collar was introduced by Henry VII., probably in consideration of a similar ornament being the principal ensign of the Golden Fleoce and other orders instituted in the 15th century; but it was first ordered to be worn in 1544. It consists of twenty-six pieces in which interlaced knots of cords alternate with double roses, each surrounded with the garter and its motto, these roses being altornately white within red and red within white; and pendent from one of the roses is the George, or figure of St George piercing the dragon. The collar and Georgo were appointed to be worn on all solenn feasts; and provision was also made for a lesser George to be worn on other occasions attached to a chain or lace of silk, for which was afterwards substituted a dark-blue riband. The lesser George is surrounded with the garter and motto.

In respect that the mantle on which are the arms of St George within the garter is only worn on special occasions, Charles I in 1626 introduced another badge to be worn on the cloak or coat, in which the cross of St George (not in a shield) is surrounded by the garter, and, to make it more splendid, ordered the whole to be surrounded with rays of silver. While the badge worn on the ordinary dress, popularly known as the star, is thus irradiated, that on the mantle has remained unaltered.

On the occurrence of a vacancy, a chapter (consisting of the sovereign and six knights) is appointed to meet, in which the now companion is elected, the election being practically a form, and tho choice lying with the sovereign. The knight elect, if at hand, appears and is invested. If absent, the garter and George are sent him by Garter King of Arms. In case of a foreign princo being elected, some person of distinction is sent along with Garter to invest him. In later times, the ceremony of election has often been disponsed with, the invostiture taking place privately, and the eeremonies connected with installation are now done away with. Each knight has his stall in St George's Chapel, Windsor; the knight elect used to get his predecessor's stall, but a system of promotion has latterly been introduced. The garter-plates of the knights, containing their arms and style, remain permanently, and those placed there in the roign of Henry VII. rank among the most valuable heraldic relies in Europe.

The officers of the order are the Prolate, who has always been the Bishop of Winchoster; the Chancellor, formerly the Bishop of Salishury, now (in consequence of a change in the division of the respective sees) the Bishop of Oxford; the Registrar, who is the Dean of Windsor; thater King of Arms; and the Centleman Usher of the Black Rod.

Knights of the Garter write K.G. after thoir names. Though the military character of this fraternity no longer exists, it has rotained till the present day its pre-eminence among the orders of knighthood of Europe. For two centuries past the twenty-five companions have been almost exclusively peers or the eldest sons of peers. See Ashmole's Institution, Laws, and Ceremonies of the Order of the Garter (1672); and Sir Harris Nicolas' History of British Orders of Knighthood (1842).

Garth, Sir Samuel, an eminent physician and fair poot, was born at Bolam, in the county of Durham, in 1660. He studied at Peterhouse, Cambridge, graduated M.D. in 1691, and next year settled in London, where he soon became famous as a physician and conversationalist. In the year 1700 he did himself overlasting honour by providing burial in Westminster Abboy for the neglected Drydon, and pronouncing a calogium over his grave. On the accession of George I. he was knighted and appointed physician in ordinary to the king, and physician-general to the army. He died in London, January 18, 1718. Garth is best known in our literary history as the author of The Dispensary (1699), a mock-heroic poetical satire on those apothecaries and physicians who opposed the project of giving medicine gratuitously to the sick poor. The poem was exceedingly popular, but has long since ceased to interest a reader. In 1715 he published his topographical poem entitled Claremont, in imitation of Denham's Cooper's Hill, and in 1717 he superintended and contributed to a translation of Ovid's Metamorphoses by Addison, Pope, Gay, Congrove, Rowe, and other eminent contributors. Garth is now interesting chiefly for his versification as a connecting link between Dryden and Pope.

Gartsherrie. See Coatbuilde.

Gas and Gases. Gas, a term applied by Von Helmont (1577-1644) to vapour not yet shown to be condensable, and possibly suggested by the Dutch geest, 'spirit,' 'ghost.' It now signifies either (1) a vaporous substance not condensed into a liquid at ordinary terrestrial temperatures and pressures, or (2) one which at ordinary temperatures is not condensable into a liquid by pressure alone. In both these senses, air under ordinary atmospheric conditions is a gas; when cold enough it is not a gas but a vapour, and pressure alone can then condense it. Sulphurous acid gas is ordinarily gaseous, but it is a 'vapour' because pressure alone will condense it at ordinary temperatures. Above 30 '92' C. (87.67 F.) carbonic acid is a true gas; no pressure will then liquefy it; but at 30.92° C. a pressure of 77 atmospheres, and below 30.92° C. progressively smaller pressures will condense it; at and below that temperature (Andrews's Critical Temperature) gaseous carbonie acid is a 'vapour,' condensable by pressure alone. Saturated steam is, in the same 720.6° C.; it cannot be liquefied by pressure unless its temperature be below that limit. The critical temperature for hydrogen is -240.4° C.; but the lowest temperature that has been actually produeed (by the evaporation of liquid oxygen into a vacuum) is - 223° C. (Wroblewski); hydrogen alone among gases has not yet been condensed. It was believed that Messrs Cailletet of Paris and Raoul Pictet of Geneva had, in 1877, succeeded in con-densing hydrogen as well as all the other gases then believed to be non-condensable; but as to brydrogen this is now considered doubtful. Hydrogen conducts itself under varying pressures and temperatures in such a way as to show that, if it could be exposed to -240.4° C., 13.3 atmospheres' pressure would condense it (Wroblewski).

Gases have small densities: hydrogen has, compared with water, a density, at 0° C. and 760 mm. barometric pressure (32° F. and 29°922 in.), of 0.000895682, and air a density of 0.0012932.

Taking hydrogen as a standard, oxygen is very nearly 16 times, nitrogen 14, air 14.47, carbonic acid 22 times as heavy.

Gases have no free surface-boundary, but ocenpy any space within which they may be confined. The smaller the space within which a given quantity of gas is confined, the greater is the expansive pressure which it exerts on the walls of the containing which it exercs on the waits of the containing vessel; approximately, for a given quantity at a given temperature, the pressure varies inversely as the volume (Boyle's Law, Mariotte's Law), or the pressure multiplied by the volume gives a constant product: pv = c. This law is fairly well obeyed by such gases as air; but in all gases, other than hydrogen, it is observed that there is with progressively increasing pressures a fall in the value of the product p v, which attains a minimum and then view, and some with hydrogen the appearent except. rises; and even with hydrogen the apparent exception has been removed by the labours of Wroblewski, who found that at very low temperatures the same phenomona were observed in that gas; and that, in general, if we draw enryes representing, for a series of gases, the respective pressures at which the minimal values of $p\ v$ occur at various temperatures, then if our diagrams are so plotted out as to represent the respective temperatures and pressures in terms not of degrees or millimetres, but as multiples of the critical temperature (measured from - 273° C. as absolute zero) and of the corresponding critical pressure of each gas, the curves are, for all gasos, the same. Under circumstances which are similar with respect to the critical temperature and pressure, therefore, all gases behave similarly in this respect; and hydrogen acts at - 183° C. (the temperature of boiling oxygen),

but not at - 103.5° C. (the temperature of boiling ethylene), like air and other gases at ordinary terrestrial temperatures. Carbonic acid gas, in order to act like hydrogen at - 103.5° C., must be at a temperature of about 1237° C.; both are then at a temperature about five times their respective critical temperatures, measured from absolute zero. When the temperature of a given quantity of gas is altered, the product p v is altered so as, to a first approximation, to be proportional to the absolute temperature (-273° C. $=0^{\circ}$ Abs.). There are, however, some abnormalities: keep the pressure constant and let the volume increase, and we have a certain coefficient of expansion under constant pressure, which is approximately $\frac{1}{2\pi}$ of the bulk at 0° C. for each C. degree of increase in temperature; keep the volume constant and let the pressure inercase, and we have a coefficient of increase in expansive pressure, which ought to be the same and is very nearly the same as the previous coefficient; but not exactly so. The former coefficient is, except in hydrogen, a very little larger than the latter; in the readily condensable gases the product p v rises more rapidly than the absolute temperature; and with progressively ascending pressures, the rate of increase of p v itself rises more markedly in the easily condensable gases than in air. These phenomena indicate the existence of inter-molecular condensable gases that the condensable gases that the phenomena indicate the existence of inter-molecular condensation of the condensation of t har forces between the particles of a gas, which manifest themselves the more clearly the nearer is the approach towards liquefaction; when the liquid state has been reached there is cohesion within the liquid. That gases are compressible by increase of pressure above the atmospherie, as well as dilatable by diminution of pressure, follows from what has been said; if the pressure be doubled the volume will be halved, and viae versa. When gases are compressed, work is done upon them, and the compressed gas tends to expand; when the pressure is wholly or partly relieved, the gas expands and does work, as in the air-gun or in compressed air machines. The pressure at all points in the same horizontal level is, or soon becomes, the same; whence, if pressure be applied to one part of a mass of gas, the pressure is soon transmitted throughout the whole, and thus energy may be conveyed, even to considerable distances. The restitution-pressure tending to cause expansion is equal to the external pressure applied; and the coefficient of elasticity is at all temperatures, provided there is no change of temperature during the compression, numerically equal to the pressure; while if the compression could be so conducted as to allow absolutely no heat to escape, then the elasticity would be numerineat to escape, then the elasticity would be inducer-eally 1'406 times as great as the pressure. Through this elasticity of gases, local displacements set up wave-motions, which, mostly in air, are the usual cause of sound. The speed of propagation of such waves (unhampered by boundary walls) is equal to the square root of the quotient of 1'406 times the pressure divided by the density; and thus the velocity of sound is, within the same gas, independent of the pressure (for the pressure and the density are directly proportional to one another). It is, however, directly proportional to the square root of the absolute temperature.

According to Dalton's Law, when a number of gases are mixed, each exerts its own pressure according to the quantity in which it is present; according to the quantity in which it is present; this law is the less perfectly obeyed the nearer the gases are to their condensing temperatures, and the greater their mutual solvent action. When a gas is greatly rarefied, a small mass holds possession of a relatively great space; such a space is called a vacuum, which in fact it is not, for two reasons—that the ether of space is not eliminated, and that traces of the gas is not eliminated, and that traces of the gas (one hundred-millionth of an atmosphere in the

hest vacua) are always retained. If two gases be placed at different levels in a vessel, even with the lighter gas uppermost, they will rapidly diffuse into one another, and even if connected only by a long glass tube they will soon mix, and will not thereafter separate. This is due to molecular movement, and dust-particles are not appreciably transferred; thus the dust of a closet is not removed, though the air is renewed, by opening the door. If, however, the two gases to be exchanged be of notably different densities, there may be a pressure resulting from the tendency of the lighter gas to pass more rapidly into the heavier than the heavier one travels into it. The rate of mixing by diffusion between two gases is measured by their coefficient of diffusivity, which is to be experimentally found. of diffusivity, which is to be experimentally found. The significance of this coefficient is that where we, adopting a consistent system of units, say centimetre, gramme, and second, state in the shape of a formula the known law of gaseous diffusion viz. that (1) the quantity of matter transferred aeross any layer is inversely proportional to the thickness of that layer, (2) that it is directly proportional to the area ovposed, (3) directly proportional to the time taken, and also (4) to the difference of densities on either side of the layer we may convert this formal statement of proportions into a numerical identity by inserting the proper numerical factor or coellicient; thus if M be the number of grammes transferred, ab the area exposed in sq. em., c the thickness of the layer, t the time, and d the difference of densities, M is proportional to $\frac{ab.t.d}{c}$, or equal to $k \cdot \frac{ab.t.d}{c}$, where

k is the coefficient of diffusivity. But k becomes a different number when we change our units of length or time; it varies numerically according to the unit of longth, and inversely according to the unit of time adopted, and hence the conficient of difficulties in the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the conficulties of the conficient of the con

according to the unit of time adopted, and hence the coefficient of diffusivity is usually stated as being so many square centimetres per second. Some numerical values for this coefficient will be found in Clerk-Maxwell's Theory of Heat (appendix). Diffusion in gases has also been measured in another way. Hydrogen separated from the outer air by a plaster-of-Paris plug, escapes into the air about four times as fast as air traverses the plug in order to get into the hydrogen. The law is that the rate of traversing the plug is inversely proportional to the square root of the density of the gas; or, in terms of the kinetic theory of gases, it is directly proportional to the average velocity of the directly proportional to the average velocity of the molecules of each gas. The rates at which gases will traverse a single small aperture ('effusion') are within the limits of experimental error, in accordance with the same law. The rates at which gases slowly pass under pressure through extremely fine long tubes, or are 'transpired,' have no relation to the diffusion or effusion rates; the mass of gas passing per second varies as the motive pressure, as the density, and inversely as the length of the tube, and also as a coefficient of transpiration special to each gas, and presenting from gas to gas certain coincidences as yet unexplained (see Graham's Collected Works, or Miller's Chemical Physics). The rate is slower the higher the temperature, but is independent of the material of the trace.

the tube.

When gases are separated by membranes, which they are unequally soluble, or for which they have unequal affinities, the diffusion rates are interfered with and become abnormal e.g. benzolvapour and air separated by a thin india-rubber membrane; the benzol traverses, the air does not. Thus also earbonic oxide, an extremely poisonous gas, may traverse red-hot cast-iron, a fact to be kept in mind in reference to overheated stoves. This is in mind in reference to overheated stoves. due to solution of the gas in the solid, which

behaves like a liquid film in reference to it. are also condensed on the surface of solids; every solid object bears a condensed film of air on its surface; some substances have enormous power of condensation, notably eccon-nut charcoal (Hunter), condensation, notably cocoa-mut charcoal (Munter), which absorbs 170 times its own volume of ammonia, 69 of earbonie acid, 44 of water-vapour. This power is beneficially utilised in charcoal respirators, in which oxygen and oxidisable gases are condensed together and combine; and in Döbereiner's hydrogen lamp, in which hydrogen plays upon platinum black, and is condensed so rapidly (perhaps being oxidised at the same time) that the platinum becomes incandescent and ignites the hydrogen jet.

The superficial film of air on solids plays a part in friction in air; a pendulum has the amplitude

in friction in air; a pendulum has the amplitude of its swing slightly diminished by this friction: a waterfall drags air down and is returded by this frictional action; and the examples of railway trains and cannon balls will readily occur. The slide-valve of a steam-engine is pressed upon by the

steam, and this gives rise to friction.

steam, and this gives rise to friction.

Gases are in many cases soluble in liquids; some are greatly so (animonia in water at 0° C., 1049 6 volumes; at 20° C., 654 volumes), some slightly (hydrogen in water at 0° C., 0.0193 volume). The general rule is (Henry's Law) that, at any given temperature, the volume of gas dissolved is constant at all pressures, so that the quantity of gas dissolved is proportional to the pressure; and on liberation from pressure some of the gas escapes. This law is interfered with in most cases by the formation of chemical compounds (hydrates) between the water and the gas dissolved. Again. tween the water and the gas dissolved. Again, when a mixture of gases is presented to a liquid, the general rule is that each is dissolved in proportion to the partial pressure exacted by it, combined with its own specific solubility in the liquid: thus the small quantity of air dissolved in water. which subserves the respiration of aquatic life, eontains 34.82 per cent. of oxygen instead of 20.9 per cent., as air does, because oxygen is more soluble in water than nitrogen is. Where, boyever, the gases have a mutual chemical action, this rule is completely departed from. One effect of the formation of hydrates may be that the gas is not expellable by holling: hydrochloric acid gas is an example: a certain excess of gas may be driven off by heat, but beyond that the aqueous solution of hydrochloric acid distus over as a minor, may monia gas or carbonic acid, on the other hand, may be completely driven off from water, any feelile hydrochates formed being decomposed. Gases may, by compressive threat of from weets, any heart hydrates formed being decomposed. Gases may, it appears, dissolve gases; oxygen ovolved from chlorate of potash may (Schützenberger) contain chlorate unrecognisable by any chemical test mutil a red heat has been applied; and it seems that there is no case of evaporation without the vapour carrying off some of the solids dissolved in the evaporating liquid, a phenomenon specially observed in the case of boracic acid solutions, and also in the case of coal-gas, which may, especially when rich in the vapour of liquid hydrocarbons, carry much solid maphthaline in a state of invisible

suspension approximating to true solution.
Gases are to a certain extent viscous; steam in motion will drag the surrounding air along with it, and will thereby have its own motion cheeked. Wave-motion set up in air may travel far, but has at length its energy worn down into heat through the viscosity of the air. Air is at 0.0° C. about a hundred times less viscous than water is, and at 90° C. it is only about twelve timos less viseous than water at that temperature. The viscosity of any given gas, dynamically measured, does not vary with its donsity.

Gases also possess a feeble power of conducting

heat by a kind of diffusion and redistribution of energy of heat-motion. In hydrogen a heated wire is very rapidly cooled; in a heavier gas, less rapidly so. The conductivity of air, when the heat conducted is reckoned in units such that each will raise a eubic em. of the substance (air) itself through our degree Centigrade, is 0 256; under similar con-ditions that of iron is 0 183, and that of copper is 1077; so that the rate of propagation of thermal effects in air is intermediate between that in iron and that in copper. This apparently high rate is due to the small density of air and to its low specific heat; and when we turn to the actual propagation of heat-energy as distinguished from that of temperature, we find the conductivity of air, in this sense, to be only about one 20,000th that of copper.

Gases have as a rule small specific heat: air has at constant pressure a specific heat = 0.2375, at constant volume 0.1684; that is, to raise a pound of air 1°, allowing it to expand, takes 0.2375 as much heat as it would take to raise a pound of water, whereas if it be not allowed to expand and thereby absorb energy, it will take only 0.1684 times as much. The specific heat of only 0.1684 times as much. The specific heat of gasos is stated in tables with reference to 'air = The specific heat of gasos is gated in cames with reference to air = 0.2375° as a starting-point; an equal volume of hydrogen has a specific heat at constant pressure = 0.2359, and, roughly, oqual volumes of all the ordinary gases have equal thermal capacities; but ordinary vapours have, volume for volume, much greater thermal capacities than ordinary gases. Hydrogen has a specific heat, weight for weight, 2.0130° times (at constant) pressure a great greater. 3.0490 times (at constant pressure) as great as water; and it is the solitary exception to the statement that water has of all substances the highest specific heat. In general the specific heat of a gas at constant pressure is about 1.4 times its specific heat at constant volumo; in the latter case no heat is absorbed in doing the work of expansion against resistance. The specific heat of gases rises slightly with increasing temperature (Mallard and Le Châtelier), and this becomes at furnace heats very well marked: at 2000° C. the specific heats of carbonic acid and water-vapour are double, and those of nitrogen, oxygen, and carbonic oxide about one and

a half times as great as what they are at 200° C.
Different gases have different actions upon radiant
heat and light; they characteristically absorb
special portions of the heat and light spectrum, and thus produce absorption bands: the dark lines A and B seen in the solar spectrum are traced by Egoroff and Khamantoff to the absorptive action of In some gases the absorption is carried so far that the gas appears coloured-e.g. chlorine, which is yellowish-green; iodino vapour in comparatively thin layers allows only red and blue light to pass, and thus appears purple; in thicker layers only blue light passes. On the whole, however, guses are poor absorbents and correspondingly poor radiators: there is comparatively little radia-tion from a Bunsen flame. At the same time the radiation from an incandescent gas tends to be yery precise in its frequencies; it tends to produce line-spectra as distinguished from the continuous spectrum produced by the untually jolting particles of an incandescent solid. Each gas has its own index of refraction also; oxygen has, for oxample, as compared with vacuum, a mean index at atmospheric pressure of 1 000272. In vapours the dispersion is great; and iodine vapour strangely re-

fracts red most and violet least.

In Electricity (q.v.) the different gases have different properties which sometimes present curious anomalies; air at ordinary pressures is an insulator; warm air at rest is au insulator, but above a Bunsen burner it is a conductor; at low pressures it conducts and glows while conducting; at extremely low pressures it is again an insulator. Different gases set up different potential-differences between themselves and metals with which they may be in contact, as in gas-batteries, and they have different specific induc-tive capacities.—Oxygen is magnetic in the same sense as iron; hydrogen and nitrogen are diamagnctie, and tend to lay themselves across the poles of a magnet. See also MATTER (STATES OF)

ANALYSIS OF GASES.—The gas is collected in ANALYSIS OF GASES.—The gas is collected in small glass vessels, the contents of which, consisting of mercury, water, or air, are displaced by the gas to be analysed. For the best methods of collecting gases from mineral springs and waters, from volcanic lakes, geysers, or boiling springs, from openings in rocks, elefts of glaciers, furnaces, fissures in volcanic craters, &c., reference may be made to Bunsen's Gasometry, translated by Roscoe. Air is only used when a considerable current of the gas to be analysed can be procured which may gas to be analysed can be procured, which may sweep out the last traces of air from the collecting Water often affects the composition of mixed gases which it is attempted to collect over it; for to various extents it absorbs, among others, hydrochloric, bydriodic, hydrobromic, and sulphurous acid gases, chlorine, sulphurotted hydrogen, ammonia, fluoride and chloride of chloride of boron, methyl- and ethyl-amine, methyl chloride and methyl ether, cyanogen, and chlorine cyanide; and it decomposes silicon fluoride with precipita-tion of gelatinous silicic acid. Mercury is generally employed because it is mert to most gases; but it

There are two leading principles made use of in the analysis of gases. First, a given volume is subjected to a chemical reaction, which results in the condensation of one of the constituents of the gase-ous mixture or compound; then by simple observa-tion, or from the known laws of gaseous volume, it is determined how great a volume of the original gas has disappeared through being amenable to the gas has disappeared through being amenable to the reaction employed, and, accordingly, how great a proportion of the constituent in question was originally present. In the case of air, for example, a measured volume may be exposed to the absorptive action of a strong alkaline solution of pyrogallol; the solution becomes dark; the oxygen is alteraled, the oxidinal values of air in divisibled. absorbed; the original volume of air is diminished; the loss of volume is ascertained, and represents the quantity of oxygen originally present in the measured volume of air. Or again, if the mixture of gases be a somewhat more complicated one, as, for example, a mixture of carbonic acid and oxide, olefiant gas, and oxygen, the various absorbent reagents appropriate to each constituent may be successively introduced, and the successive shrinkages noted by remeasurement at the original tenperature and prossure. A few drops of a solution of caustic polash will in this way take up the carbonic acid; pyrogallol will take up the oxygen; anhydrous sulphinic acid dissolved in oil of vitriol, and introduced on a coke-pellet, will slowly take up the olefant gas, and the sulphurons acid and anhydrous sulphuric acid vapour, which contaminate the gas after this reaction, may be removed by caustic potash; and carbonic oxide may be absorbed by means of a solution of cuprous chloride (pre-pared by leaving copper turnings with a saturated solution of cupric chloride in a stoppered bottle for somo days), which will take it up in about ten minutes. The principal absorption reagents are (1) caustic potash solution, which absorbs sulphuretted hydrogen, hydrochloric, carbonic, sulphurous, and other acid gases, chloride and fluoride of boron, and chloride of cyanogen, and decomposes silicuretted hydrogen with evolution of 4 volumes of hydrogen; (2) dry caustic potash, which acts like the solution, but more slowly, and also absorbs

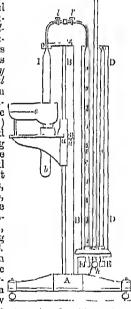
water-vapour; (3) alcoholic solution of caustic potash, which also absorbs bisulphide of carbon; potash, which also absorbs bisulphide of carbon; (4) alkalinised solution of pyrogallol—oxygen; (5) phosphorus—oxygen; (6) enprous chloride dissolved in hydrochloric acid—oxygen, carbonic oxide, acetylene, and allylene; (7) the same dissolved in ammonia, which absorbs also the hydrocarbons of the olefine series; (8) dilute sulphuric acid—ammonia, inethyl-amine, and other amines; (9) strong sulphuric acid—water, alcohol, methyl ether, pronylene and its homolognes: ethylene slowly. strong sulphuric acid—water, alcohol, methyl ether, propylene and its homologues; ethylene slowly, hydrogen and marsh gas not at all; (10) Nordhausen sulphuric acid, which absorbs the olefines, not bydrogen or the marsh-gas series; (11) concentrated aqueous solution of sulphate of iron, which absorbs nitric oxide; (12) bromine, which in presence of water acts like Nordhausen sulphuric acid; (13) sulphur, which absorbs sulphuretted hydrogen, sulphurous acid, and bisniphide of carbon; (14) eliromous sulphate, to which amonium chleride and ammonia have been added. monium chleride and ammonia have been added, absorbs oxygen, nitric oxide, acetylene, and allylene; (15) alcohol absorbs chloride of cyanogen, methyl chloride, methyl ether, and cyanogen; (16) mercuric oxide—cyanogen; (17) lead acetate—sulphmetted hydrogen; (18) lead peroxido—sulphurous acid. Analyses conducted by the aid of such reagents are direct; and on the same principle of observation of shrinkage we may also employ explosion reactions. In the case of air we take a measured volume and add to it about half its balk of hydrogen, observing precisely what volume we add. In this case the graduated tubular vessel, in which the gas is contained, has two platinum wires fused into it so as to approach one another within the vessel; our vessel is then called a Eudiometer. An electric spark is made to leap across the interval between the two wires; an explosion occurs; part of the hydrogen of the mixture combines with the whole of the oxygen; presently the aqueous vapour formed condenses, and the volume of the mixture becomes, at the former tempera-ture and pressure, considerably less than it was before the explosion. The shrinkage is measured; the gas which has disappeared consisted, for every three volumes, of two of hydrogen and one of oxygen. One third of the shrinkage, therefore, represents the amount of oxygen present in the air subjected to this process; and in the ease of air the balance of the original volume is taken (if the air had been freed from moisture and carbonic acid) as consisting wholly of nitrogen. In more complicated mixtures the explosion-reactions lead to more complicated processes and calculations. For example, if we have a mixture of hydrogen, methane, carbonic oxide, and nitrogen (which corresponds to coal gas that has been passed through potash solution and has stood over strong oil of vitriol), we first explode a known volume of the mixture with an excess of oxygen. The shrinkage is observed, and then potash solution is introduced in order to remove the carbonic acid formed by the combustion of the methane and the carbonic oxide. The nitrogen alone now remains, together with the excess of oxygen; and the amount of the latter is determined by another explosion with hydrogen, whence the amount of nitrogen may be determined; and from this we find the volume of combustible gas originally present in the mixture. We now know (1) the volume originally used (A); (2) the volume of combustible gas therein contained (B); (3) the contraction of volume on explosion (C); and (4) the volume of carbonic acid generated on explosion (D). We also know that when hydrogen is exploded with an excess of oxygen the combustion of one volume of hydrogen causes the condensation of 1½ volume of the mixture; that the combustion of 1 volume of

carbonic oxide similarly causes a shrinkago of $\frac{1}{2}$ volume, and the production of 1 volume of carbonic acid; and that the combustion of 1 volume of methane (light carburetted hydrogen, marsh-gas, CH₄) produces a shrinkage of 2 volumes and the formation of 1 volume of CO₂. Hence we find that the shrinkage C is made np of the original H-volume × $\frac{1}{2}$, plus the CO-volume × $\frac{1}{2}$, plus the CO-volume × $\frac{1}{2}$, plus the CH₄-volume × 2; and that the carbonic acid (= D) is equal to the CO-volume plus the CH₄ volume; and if we set down these statements algebraically, writing w for the original volume of nitrogen, x for that of hydrogon, y and z for those of carbonic oxide and marsh-gas, we have the equations A = w + x + y + z; B = x + y + z; D

nitrogen, x for that of hydrogon, y and z for those of carbonic oxide and marsh-gas, we have the equations A = w + x + y + z; B = x + y + z; D = y + z; and $C = \frac{3x}{2} + \frac{y}{2} + z$, from which w, x, y, z may be readily found and thereafter reduced to percentages. If any of these quantities, w, x, y, z, be found equal to 0 (or to a small negative quantity), the corresponding gas is not present in the mixture.

The apparatus made use of varies from a simple graduated tubular vessel to the more elaborate compensating apparatus now in use. The object of compensation is to enable the volume of the gas

to be ascertained without calculation for correction. We may refer by way of illustration to the apparatus of Frankland and Ward, which is fully explained in Williams' Handbook of Chemical Manipa-Journal of the Chemical Society. We take as an example an explosionanalysis of atmospheric air. A few (three or lour) cubic inches of air, freed from carbonic acid, having been introduced into the tube, I, it is transferred into F for measurement by opening the eocks, l, l', and placing the tube, F, in connection with the exit-pipe, h; the trans-ference can be assisted, if necessary, by clovating the increasing the property of the (The part marked b in the figure is merely the tubular well of the mer-curial trough, C.) When the air, followed by a few drops of mercury, has a passed completely into F, the cock, l, is shut, and j turned, so as to connect F and H with h. Mercury is allowed to flow out until a vacuum of two or until a vacuum or two or three inches in length is formed in H, and the metal in F is just below one of the graduated divisions; the cock, f, is



screws; BB, a vertical pullar, to which is attached Q, a mercurial trough, movable by a rack and phinon, aa; DD, a glass cylinder, 36 inches long, with an internal diameter of 4 inches, containing three tubes, F, Q, II, which communicate with one another, and with the exit-pipe, h, by the apparatus E JE. The rest of the figure will be sufficiently intelligible from the description given in the text.

then reversed, and mercury very gradually admitted from G, until the highest point in F exactly corresponds with one of the divisions upon that tube; we will assume it to be the sixth division, there being ten divisions in all. This adjustment of mercury, and the subsequent readings, can be very accurately made by means of a small horizontal telescope, placed at a distance of about six feet, and sliding on a vertical rod. The height of the mercury in H must now be accurately determined; and if from the number thus read off the height of the sixth division above the zero of the scale in H is deducted (the scale on H is not marked in the figure), the remainder will express the true volume of the gas, no corrections being required for variations of temperature, atmospheric pressure, tension of agueous vanous. Sec.

sure, tension of aqueous vapour, &c.

Hydrogen, in the proportion of half the volume of the air used, must now be passed into I, and from thence into F, when the volume of the mixed gases must be again determined as before. An electric spark must now be passed through the mixed gases in F by means of the platinum wires at m (near the top of F). A slight explosion occurs, after which we observe a considerable contraction in the volume of the mixed gases, and one-third of this shrinkage represents the volume of oxygen. (For other instruments, see Zeitschrift für analytische Chemie, Bd. xxv. p. 467; Berliner Chem. Berichte, Bd. xx. p. 2340; Journal für Gasbeleuchtung, 1889,

p. 3).

The objection to this kind of gas-analysis is its comparative slowness. When we wish to control the process of coal-gas-making, or the processes of combustion or decomposition occurring at various levels within a furnace, it is necessary to collect a series of specimens during the progress of the decomposition, but the results of gas-analysis are rarely available with useful expedition. Whore it is sufficient to trace up one special constituent, such as sulphuretted hydrogen in coal-gas or carbonic acid in ventilation-experiments, results of considerable value may be attained by passing known volumes of the gas through a known quantity of a test-liquid, or shaking it up with it, and measuring by titration the amount of the reagent unaffected by the particular constituent of the gas; or, more rapidly, by the gradual addition of one to the other until the mutual reaction ceases. For instance, 100 cubic em. of crude coal-gas may have successive instalments of a dilute solution of iodine of known strength brought into contact with it; when the reaction ceases the iodine solution ceases to be decolorised by the sulphuretted hydrogen, and if starch be present a blue tint will be struck. This method (Dingler's Polytechn. Journal, 1888, Bd. celxix. p. 232) enables small quantities of gas to be dealt with, and small percentages to be estimated; and to a certain extent successive reagents may be applied for the estimation of different constituents.

Gas, Lighting and Heating. I. Coal-gas is produced by the simple distillation of dry coal. Anthracite coal is unsatisfactory: the greatest yield of the best gas is obtained from highly bitunitious coals, the disadvantage attendant on the use of which is that they are expensive and leave as residue an inferior or worthless coke, mainly ash; practically the most useful gas-coal is that which will, either alone or mixed with a certain proportion of bituminous coal, yield a fair quantity of good gas and leave good coke in the retorts. The very highly bituminous coals are only used for mixing with ordinary coal: the ordinary hituminous or cannel coals are largely used, especially in Scotland, for making richer gas of 25 to 30 candle-power (in standard burners burning 5 cubic feet per hour), and are usually mixed with ordinary coal with the view of improving the coke produced. The ordinary eaking coals of the north of England are mainly used in England, mixed with a proportion of cannel or of highly bituminous coal or shale in order to improve the gas, which is generally sup-

plied with an illuminating power of from 16 to 20 candles. The gas-coal used on the Continent is intermediate between caking coal and cherry coal, and gives gas of from 12 to 17 candles. By bituminous coal is not meant coal which actually contains bitumen, but coal which contains carbon and hydrogen in a proportion suited to the formation of heavy hydrocarbons when the coal is exposed to heat: no bitumen can bo dissolved by alcohol out of a so-called bituminous coal. The proportions of hydrogen and oxygen to the carbon in various materials is shown in the following table:

	Carlson, per cent	Hydrogen, per cent.	Ovygen, per cent.	Hydro, per 100 cath	Ovy. per 100 carb.
French authracit	2 204	1.40	••	1.6	
(Istre) Glamorganshire anthracite	01.5	3.2	2.6	3-8	2.8
Average Newcastle	82.1	5.3	5.7	0.4	9.9
Wigan cannel Boghead inneral	70.2	6·1 8·86	7·2 4·70	7·7 13·S	0·1 7·4

The hydrocarbons which enable the gas to give a luminous flame depend for their formation upon the presence of hydrogen: oxygen, on the other hand, is detrimental; it takes up hydrogen to form water, and with carbon it forms earbonic acid and carbonic oxide. Hence we should expect considerable differences between the results of distillation of these substances. Anthracite gives no useful result; Newcastle gas-coal gives, per ton, a little over 10,000 eubic feet of gas, of an illuminating power ranging between 14 and 20 eandles; Scotch eannel, 10,600 feet, of 30 candles; Scotch Boghcad, distilled alone, 13,000 feet, of 40 candle, or 15,000 feet, of 35 eandle; and Australian Boghcad, 14,000 feet, of 50 candle-gas. These are given merely as typical examples; the results vary groatly according to the temperatures employed and the duration of the exposure to heat. Newcastle cannel coal, for example, if distilled between 750° and 800° F., yields, per ton, 68 gallons of crude oil (whereof may these substances. Anthracite gives no useful refor example, if distilled between 750° and 800° F., yields, per ton, 68 gallons of crude oil (whereof may be recovered, paradin spirit about 2 gallons; lampoil, 22½ gallons; heavy oil and paradin, 24 gallons), 1280 lb. of coke, and only 1400 cubic feet of gas; whereas, when it is distilled for gas in the usual way, it yields, besides the coal-gas, 18½ gallons of coal-tar (wherefrom 3 pints benzol, 3 pints coal-tar naphtha, and 9 gallons of heavy oils, naphthaline, &c.), and 1200 lb. coke. Protracted distillation at high heats causes the evolution of hydrogen rather than of hydrogarbons, high heats in general cause the production of volatilo rather than of condensable hydrogarbons, and this results, if not carried densable hydrocarbons, and this results, if not carried to excess, in a decided advantage—viz. that the to excess, in a decided advantage—viz that the gas produced, though of lower quality than the smaller quantity produced at low heats, is greatly less liable to lose its illuminating power by condensation and deposition of hydrocarbons on the way to the consumer. Very roughly, the candle-power is, within a limited range, inversely proportional to the number of feet of gas made (at a given temperature) from a given quantity of coal. Thus, if a ton of coal give 10,000 cubic feet of 154 candlegas, then, if the distillation be protracted so that gas, then, if the distillation be protracted so that 10,500 feet are produced, the candle-power will sink to 15. According to Dr Tieftrank, the pereentage composition (in volumes) of the gas which comes off in successive hours may be represented as follows:

1	ist hour.	2d hour.	3d hour,	4th hour.	5th hour.
Heavy hydro-	- 13	12	12	7	
Marsh-gas	82	72	58	56	26
Hydrogen Carbonic oxide,		8.8	16	21.3	60
Carbonic oxide	3.2	1.0	12.3	11	10
Nitrogen	1.3	5.8	1'7	4.7	10
Rolative volumes in successive hours	1	0.082	6-387	0.165	

The distillation is thus after the fourth hour

practically disadvantageous to the illuminating

power.

The products of distillation of coal, as usually performed in gas-works, are very numerous. The principal of them are marsh-gas, hydrogen, carbonic oxide, carbonic acid, nitrogen, oxygen, sulphuretted hydrogen, ammonia, hydrocyanic acid, bisulphide of carbon, and other organic sulphur compounds; aqueous vapour; ethylene, propylene, butylene, acetylene, ditetryl, and allylene; caproyl, capryl and rutyl hydrides; caproylene, manthylene; benzol, toluol, xylol, cymol; paraffin, naphthaline, anthracene, chrysene, pyrene; acetic acid, carbolic acid, cresol, phlorol, rosolic acid; aniline, pyridine, picolin, and several other nitrogenous alkaloid substances; with some hydrochloric and sulphurous acids. These substances have very different volatilities and solubilities; a large number of them may be separated from the gas by mere cooling, and together these form coal-tar, which is a black viscous liquid, sp. gr. 0.98 (from cannel) to 1.15 (from ordinary coal), the yield of which is, from coal, up to 12 gallons, and from cannel up to 17 gallons per ton distilled, the average yield being scarcely 11 gallons. By careful distillation coaltar yields successively the following products, the percentages of which vary widely from the product of one gas-work to that of another: 2-4 per cent. of water, ammonia (which may be extracted from the tar by cold water), and volatile hydrocarbon vapours; 1.5 to 16 per cent. of light oils, including carbolic acid; 20-35 per cent. of heavy oils (creasote oils); 10-20 per cent. of anthracene oils, and a residue of 28-64 per cent. of pitch. The reason of this wide range of variation in the tar lies partly in the nature of the coal used, the temperature of distillation (the higher the heats the thicker the tars), and partly in the mode and temperature of condensation.

After the tar has been mostly deposited tho gas is washed with water, which is converted into ammoniacal liquor, containing ammoniae, carbonate of ammonium, sulphide of ammonium and some sulphite, chloride, and sulphocyanide of ammonium, and salts of nitrogenous alkaloids. After being cooled and washed the gas still contains carbonic acid, sulphuretted hydrogen, some hydrocyanic acid, and some bisulphide of carbon, and other sulphur compounds. Slaked lime, moistened so as to form a porous mass, will absorb the carbonic acid and sulphuretted hydrogen, but not the hydrocyanic acid and sulphuretted hydrogen, but not the hydrocyanic acid and bisulphide of carbon so long as there is free carbonic acid present. Oxide of iron absorbs H₂S, becoming sulphide; and this, when re-exposed to the air, is reoxidised, the oxide being regenerated, while free sulphur is formed mixed with the oxide; the oxide may be used over and over until the percentage of free sulphur rises to 50 or 56, after which the oxide is 'spent,' and is transferred for the sake of its sulphur to the manufacturing chemist. Spent oxide also contains a valuable product—viz. Prussian blue, or ferrocyanide of iron, Fe₇Cy₁₈; this, together with sulphocyanide of iron, is formed from the hydrocyanic acid. Further, the free sulphur in the oxide arrests bisulphide of carbon and other sulphur compounds to a large extent. The regeneration of the oxide can be brought about, without raking it out from time to time upon a floor and turning it over, by admitting a percentage, say 2, of air into the gas-stream. The oxygen of the admitted air is taken up in continuous regeneration of the purifying oxide. The disadvantage of this is that the residual nitrogen of the air tells against the illuminating power of the gas; but recently, since pure oxygen has become cheap, oxygen gas alone has been employed with very favourable results. One result of continuous revivication is, that the evil smells

associated with the opening of purifiers have become unfamiliar in most works. When continuous regeneration is resorted to, the oxide does not become spent until it contains a considerably higher percentage (as much as 75) of sulphur. Iron oxide, however, does not remove carbonic acid, and Mr R. H. Patterson showed that complete purification might be seenred by removing (1) CO₂ by means of lime (the carbonic acid having a stronger affinity for lime than sulphuretted hydrogen has, is retained in the first lime purifier, while \(\text{I}_2\sigma \) cither passes on directly or is driven off by the succeeding \(\text{CO}_2\) from any temporary lodgment it may have gained in the first purifier); (2) \(\text{I}_2\sigma \) by a second lime purifier, the resulting sulphide of calcium uniting with the bisulphide of carbon to form thiocarbonate of calcium, \(\text{CaS}_2 = \text{CaCS}_3 \), analogous to carbonate of calcium, \(\text{CaS}_4 \cdot \text{CaC}_2 \), or rather a basic compound \(\text{CaS}_3 \), \(\text{CaH}_2\text{O}_3 \), \(\text{T}_3\) and so with other sulphocarbon compounds; and (3) if necessary any remaining \(\text{I}_3\text{D}_3\) may be taken up by iron oxide. In \(\text{ISS}_8\text{So} \) Mr Valon found that if 0.6 per cent, of oxygen be added to crude gas, and if time be used alone as the purifying agent, there is complete and simultaneous removal of the carbonic acid, sulphuretted hydrogen, and sulphide of carbonic acid and through not introducing untrogen, the lighting-power of the gas is at least \(\text{l}_2\) candle better than when iron oxide is employed alone.

The purified gas contains, in percentages by

volume :

	London	London	Doglead
	common (las,	Cannel Gas.	Ons.
Heavy hydrocarbons	40	13	21.5
Marsh-gas.		50	58.1
Hydrogen		27:7	10.5
Carbonic oxide	0.7 0.5	2 0.4 0.8 0.8	8.6

The illuminating power depends on the 'heavy hydrocarbons;' of these benzol is the most effective (3 parts of it being oqual to 25 of ethylene), and in ordinary English gas is present to the amount of from 5 to 10 grains per embic fact, while ethylene and propylene are together from four to twelve times that quantity. If carbonic acid, sulphuretted hydrogen, and nitrogen he absent, the heavier gas is generally the richer, though a high percentage of carbonic oxide may also make a gas heavy. The specific gravity of coal-gas is from 0.4 to 0.55 (air = 1.00). There are two rough tests far the value of gas: (1) its durability—i.e. the time taken to burn 1 cubic foot of gas in a jet of 5 inches high; this ranges from 50' 40" for English caking coal-gas, to 84' 22" for Boghead gas; (2) the percentage of volume which is condensed by chlorine or bromine, which attack the heavy hydrocarbons. If any carbonic acid remain in the gas it will diminish the illuminating power about one candle for every 1 per cent. of carbonic acid. If gas be mixed with air the illuminating power rapidly falls off: with 1 per cent. of air, the loss of lighting-power is 6 per cent; with 2, 11; 3, 18; 4, 26; 5, 33; 10, 67; 20, 93 per cent.; 45, total loss of lighting-power. Ordinary gas mixed with more than 4 and less than 12 times its bulk of air is explosive; most so when mixed with 8 volumes of air—or somewhat more (up to 11 volumes) if the gas be richer. Alone, it is not explosive. For ascertaining the illuminating power, the Bunsen photometer (the open 60-inch Bunsen-Letheby photometer, or the enclosed 100-inch Evans photometer) is generally employed. In this, at one end of a rod, there is a candle; at the other end there is a gas-burner, and a meter to measure the supply of gas; the gas-burner and the candle are thus at a

fixed distance from one another. Between them there moves, sliding on a graduated bar, a disc of prepared paper; this is slipped up and down until its two sides (or rather the images of its respective sides in two little mirrors which travel with it) appear equally illuminated. The bar may be graduated in one of two ways: (1) Equal intervals, as that the respective distances between the disc so that the respective distances between the disc and the gas-burner and candle may be measured; then the ratio between the intensities is the inverse ratio of the squares of the respective distances; say, for example, that the respective distances of the candle and gas-lurner are 20 inches and 80 inches; then the gas-burner's intensity: the candle's $:: \left(\frac{1}{20}\right)^2 : \left(\frac{1}{80}\right)^2 - i.e. :: 16: I.$ (2) The bar may be so graduated as to anticipate and save this calculation, on which principle the mid-point of the har would be marked 1, and a point one-fifth of the bar's length from either end would be marked 16; the figures so marked show directly the ratios sought for. The operation of photometry is a little troublesome (Schedule A, Gas-works Clauses Act, 1871); the pressure of gas must be measured by a gange and regulated by a governor; the consumpt of the candle must be weighed; the gas used must be exactly 5 cubic feet per hour; the burner is a standard Sugg's London Argand No. 1 for common coal-gas, a standard Steatite Batswing burner for coal-gas, a standard Steatite Batswing burner for cannel gas; the candles are sperm candles, of six to the pound, each burning 120 grains per hour; and the quantity of gas used is to be corrected for temperature and barometric pressure. The candle is a very unsati-factory unit of light; it varies as much as 6 per cent, and its colour is not the same as that of the gas-flame. Other standards have been proposed: of these the principal are the German standard candle = 1 023 English sperm candle; the Erench Caycel Jany (648 grains color of the the French Carcel lamp (648 grains colza-oil per hour) = 7.435 English sperm candles; Mr Vernon

Harcourt's pentane lamp, air + pentane vapour, 2 cubic foot per hour, nearly equal to the English standard candle; Mr Methyen's and Mr Fiddes's standard, in principle a given area of the bright part of any gas-dame, this being, singularly, an almost uniform standard of illumination; Herr von Hefner-Alteneck's anyl-acetate lamp, with the flame turned up to a height of 1 6 inch, almost exactly an English standard candle. Other photometers (Elster's, with movable standard light, &c.) have been proposed. Lowe and Sugg's jet-photometer depends on this, that assuming the height of the flame to be kept constant, the lighting-power of a jet is inversely proportional to the consumpt— or otherwise, that the consumpt being kept constant, the height of the jet-flame is directly proportional to the lighting-power. In Grond's jet-photometer the height of the flame at constant pressure is taken as the measure of illuminating power; when the flame is about 6 inches high, a variation of about & inch corresponds to a variation of one-candle power, when the whole lighting power is from 10 to 14 candles per 5 cubic fect.

The apparatus in use within a gas-work for the production, purification, and supply of coal gas may be briefly described under the following heads: (1) The retort-house; (2) ascension and dip pipes; (3) hydraulio main; (4) tar-well; (5) condenser; (6) washer; (7) scrubber; (8) exhauster; (9) purifiers; (10) change-valves, connecting pipes, and by-passes; (11) station-meter house; (12) gasholder; (13) governor.

The Retort-house contains the benches or sets of retorts in which the contains the benches.

retorts in which the coal is distilled. The retorts were formerly small, and of cast-iron only; they are now generally larger and of fireclay; though the use of iron is again becoming familiar in cases where the last retort or two of a set are more easily heated if made of iron than when made of fireclay. Retorts are made round, oval, and D-shaped; the first of

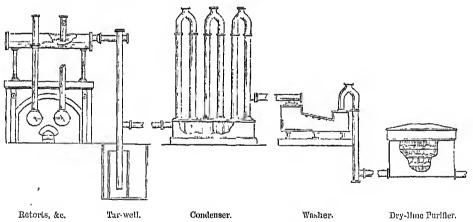


Fig. 1. - Elevation of Gas-works.

these is the strongest and most durable; the oval | these is the strongest and most durable; the oval and the D-shaped are better earbonisers. Clay retorts are usually 2½ to 3 inches thick, oval, with diameters 15 and 21 inches inside, and 9 feet 4 inches long; but 'through' retorts are often used, corresponding to two ordinary retorts joined together so as to form one tube, same 18 feet long, with a mouthpiece at each end—a form which is more readily manipulated and more readily kept clear of coke-deposit. It has been pointed out that even these diameters are somewhat too great, and that the result is better with narrower retorts; and in the result is better with narrower retorts; and in small works smaller and shorter retorts are gener-

ally used. The Dinsmore retorts are Z-shaped, and the tarry products are subjected to continued distillation in the upper bends; a better yield of gas is said to be obtained. Five or seven retorts, and sometimes ten or more are built horizontally into each oven; and all the retorts of one oven are heated from the same source. This may be a coke furnace, in which case some 3½ cwt. of coke are used in distilling each ton of coal—i.e. about 25 per cent. of the coke made—a proportion which sinks in large works to 20 or 18 per cent.—or tar may be used as fuel, either dropped on hot plates or blown in by air or by steam as spray; or generator

furnaces may be employed in which the fuel is first half-burned (CO being formed), and the hot furnace gases thus produced are burned under the retorts; or regenerative furnaces, in which the same thing is done, but the air which meets the furnace gases under the retorts is heated by the waste heat, which would otherwise have been allowed to escape through the flue after the retorts had been heated; the result being a great economy in fuel and in the wear of the retorts. The retorts, once heated up, are kept continuously at an orangered heat (2000 F.); they are charged with coal (2½ to 3 cwt. each); the charge is raked out after three or four hours, and a fresh charge is put in; the charging and drawing being now often done by machinery. The duration of clay retorts depends nachinery. The duration of clay retorts depends on the treatment they receive; fifteen to eighteen months where directly exposed to the fire, or, where protected, three or four years, or even longer. Every retort is provided with a mouthpiece, through which the charge is put in and extracted, and the door of which is pressed home by a screw or lever and may or may not be secured by a serew or lever and may or may not be seemed by cement, according to the construction, while the gas is being produced; the gas produced passes from the retort by means of a wide vertical ascending pipe (2), a very short horizontal bridge-pipe and a short descending dip-pipe, which dips to a very slight extent below the overflow level of liquid in the hydraulic main (3). This hydraulic main is a wide timble releval reservoir of warnety. main is a wide tubular closed reservoir of wroughtiron, placed above the retorts; it has a large iron, placed above the retorts; it has a large descending overflow-pipe; it is first filled with tarwater as far as it can be filled; the products of distillation from the letort pass through the hydraulic main; some tar is deposited, some watery liquid condensed; tar accumulates up to the overflow level, so that the gas passing through is washed in hot tar, and the light-giving constituents tend to become dissolved out to a large extent by the tar, unless the tarks a large when the tarks with a tark and the constituents. stituents tend to become dissolved out to a large extent by the tar, unless the tar be kept sufficiently hot or be separately removed from the hydraulic main. Down the overflow-pipe run the products of distillation which sink into a tar-rell (4), from which they are pumped out from time to time. This tar-well is also used as a general receptacle for condensation products deposited by the gas in its further course. The gas does not escape by this tar-well, for the overflow-pipe dips to an adequate depth into the liquid in the well; it passes on by a lateral horizontal tube. This device is repeated as often as it is necessary to withdraw is repeated as often as it is necessary to withdraw condensation-products from the gas-stream.

The gas goes on to undergo a gradual process of cooling (to a temperature not below 55° F.) and farther condensation, partly in pipes led round the retort-house (in which the tar is largely deposited by friction while the gas is still hot), partly in the condenser: (a) a series of vertical iron tubes in which the gas alternately ascends and descends, the cooling being due to the exterior air or to the trickling of water down the surface of the tubes; (b) vertical iron tubes of large size, concentrically arranged in pairs, so that the gas may slowly descend in the annular space between each two tubes, while the cooling air ascends the inner tube; the gas is then led up to the top of another annular space, and so on (Kirkham's); (c) a horizontal spiral; (d) arrangements for retarding the speed and thus enabling the gas, in comparative repose, more readily to deposit any particles; — battery condenser; Mohr's condenser, in which the gas is guided through hollow cones, so as to run slowly. The liquid deposited is conveyed by an overflow-pipe to the tar-well. The cooled gas is then led to the washer (6), in which it is passed in fine streams through water, which dissolves ammonia, &c.; but

here or farther on, after the sembler, there is a here or farther on, after the semilor, there is a suction arrangement, either a fan, a pump, or a steam-jet injector, called the exhauster (8), which causes the gas to flow from the retorts through the successive pieces of apparatus. The coal being thus distilled in a partial vacuum, gas is more readily given off by it; and the gas onco formed is rapidly removed from the retort and from the decomposing influence of the hot retort-walls, and its percentage in hydrocarbons is thus kept as high as may be. After the washer comes the scrubber (7), in which the gas is made to ascend a lofty column filled with coke or deal boards, down which water trickles, or is made to ascend a space lilled with descending spray. Sometimes the gas is made, as in Polonze and Andonin's so-called condenser, to deposit the last traces of tar by impact against solid surfaces; or may be made to run with or against a stream of hot tar, and thus to pick up hydrocarbons from the tar. Sometimes the functions of washer and scrubber are combined in one piece of apparatus; sometimes a scrubber is used alone. The gas next passes through the purifiers (9), in which it has to pass slowly up, or purifiers (9), in which it has to pass slowly up, or better down, through an ample extent of thick layers of porous line, or of iron oxide somewhat moist and rendered porous by sawdust, chall, or other vehicle, or aided by porous magnesia, or through both, or else through washed Weldon slime. The gas onght, before this stage, to be free from all impurities, except carbonic acid, sulpharetted hydrogen, and bisulphide of carbon, and these are tenoved in the purifiers. Various devices have also been introduced for absorbine these have also been introduced for absorbing these materials by means of annuonia and hydrocarbons separated in the earlier stages (Young, Claus, Hills). The British parliamentary standard of purity is that 10 cubic feet of gas shall not stain lead paper (absence of sulphuretted hydrogen); that the ammonia in the gas shall not exceed four grains per 100 cubic feet; and that the whole sulphur in the gas shall not exceed twenty-two grains per 100 cubic feet. The purifiers are so arranged that while a sulficient large area of puri-fying material shall always be encountered by the as, one part of the purifiers after another is thrown out of action, and renewal of the material is thus possible, when required, without interruption to the purification. The raives and connecting pipes (10) are so arranged as to permit this alternation to be readily effected; and throughout the range of apparatus in a gas work, the pipes are so arranged as to permit any single piece of apparatus to be ent out of the gas stream when occasion requires.

The gas goes on from the purifiers to the station-meter house, in which there are (a) the station-meter, a large 'wet' moter for measuring the whole make of purified gas; (b) the exhaust, previously referred to; (c) pressure gauges, and (d) pressure-recording instruments; (c) the station-governer, by adjustment of which the pressure of gas as supplied from the gasholder to the mains is to be regulated; all these items being brought together into one place for convenience, the pipes within the works are arranged accordingly. From the station-meter the gas goes on to the gasholder (12), or holders, to be stored and issued as required. The gashelder is an inverted cylindrical vessel of sheet-iron, placed in a tank of stone, brick, concrete, cast or wrought iron, steel, or a combination of these, but generally of brick or stone, lined with Portland cement, or backed with clay puddle, and, where possible, such into the ground. The tank contains water, in which the ground. The tank contains water, in which the ground reseal floats and rises or sinks. As the floating holder rises and sinks, it is kept vertical by tall columns which surround it, and guide its

motion. On the tops of these columns are pulleys, over which run chains which at one end are connected to the crown of the gasholder, while at the other they hear suspended balance-weights. These balance-weights are not quite heavy enough to balance the weight of the floating vessel, which thus tends to descend and press the gas (contained between the water and the crown of the holder) out into the mains, and also back through the station-meter; but they so nearly poise the floating holder that the small pressure at which the gas is delivered through the station-meter is sufficient to lift the holder, and thus to enable gas to accumulate in it when there is no outflow through the main; and when there is such an outflow, the gasholder oscillates up and down according to the proportion between the gas taken off from the mains and that supplied from the retorts. When the diameter of a gasholder is proportionately great, it does not need counterbalancing. It is comparatively not a heavy structure, and it contains a gas which is lighter than air, so that the pressure upon the base, so far as due to the sheetiron holder and its contents, readily comes to be but little more than that which would have been due to an equivalent quantity of air. Mechanical ingenuity has been spent upon framing the holder by means of ribs and internal bars, so as to give the maximum strength (freedom from bucking)

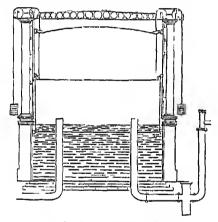


Fig. 2. - Section of Telescope Gasholder.

with the least weight; and upon the construction of telescopic holders, in which the holder is constructed in two, three, or four lifts or cylinders, of which only the inner one has a crown. In each pair of cylinders the inner one has its lower free edge turned up, so that when it rises it hooks into the down-turned uppor free edge of the outer cylinder, and, as the gasholder goes on filling, lifts the outer cylinder from the tank, and so, if there be more than two lifts, for each succeeding cylinder; the gas being prevented from escaping between any two of these mobile cylinders by the water which the inner one lifts from the tank in its upturned edge. Recently the construction of the gasometer has been managed in such a way as to dispense with the columnar guides. Necessarily, the space within the gasholder above the tank-water is, by means of pipes, placed in communication both with the station-meter and the mains. The function of the gasholders is a most important one; they act as a reservoir and usually are of a capacity sufficient to contain a twenty-four hours maximum supply (the quantity used on a midwinter day); and they also equalise the pressure. The gasholder is the feature of gas-supply which ensures

a regular supply at all hours both of day and night; and it is also conducive to economy, for a comparatively small plant, kept continuously working, is by its means enabled to meet demands for which, if the gas were supplied direct from the retorts, it would be quite inadequate.

Before reaching the mains the pressure of the gas is regulated by the station-governor (13); this is necessary, because an excessive pressure in the mains would

result in excessive leakage. The governor been the has anhject o f several ingenions devices; the object of all is the same-viz. the automatic adjustment of resistance, whose amount is made to inercase or diminish with the pressure; this is accom-plished cither cither by the gas lifting to a greater or less degree the floating bell of a small gasholder, and thereby altering the position of a conical or parabolic plug snspended with-

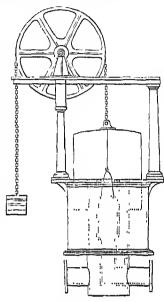


Fig. 3.-Section of Gas Governor.

in the entrance to the main, or in some cases

(Hunt's) by working a thrattle-valve.

The gas is conveyed from the works by mainpipes or mains, generally of cast-iron, carefully jointed; the jointing is effected either by turning and boring so as to make the pipes fit easily with a little white and red lead, or by using pipes which do not exactly fit, and making them do so by means of caulking, melted lead, india-rubber, or rust cement; in some cases the pipes are connected by ball-and-socket joints, and can then he paid out of a boat like a chain; in others, special provision is made for expansion. At each lowest point provision is made for taking off water, as by a trapped drip-well, the liquid in which can be pumped out into a cart and taken to the gas-works. When mains supply a district the altitudes in which vary considerably, the tendency is for the local pressures to vary correspondingly; a difference of 100 feet in level makes a difference of 15 inch of water in a pressure-gange; and therefore it is necessary to use district-governors which control the pressure in particular districts. To the mains are connected branch or service pipes, usually of wrought-iron or lead, in which the possible deposition of moisture must be provided for, either by making the whole service-pipe drain into the main, or by fitting up a drip-well at each lowest point.

The gas supplied is measured by meters, of which there are two main varieties, the wet and the dry. The wet meter is a device for measuring out successive units of volume of gas; the reading will be the same whether the gas be delivered at low or at high pressures; and therefore the lower the pressure the less the absolute quantity of material in gas measured through a wet meter, and vice versa. In a wet meter there

is a cylinder mounted on an axis; this cylinder is hollow, the hollow being divided into four parts or chambers by partitions, the longitudinal boundaries of which present the form of an Archimedean screw or the rifling of a gun; the gas enters one of these spiral chambers at one end; as the gas is pressed in, it displaces water and makes the hollow space lighter than water; it thus makes the hollow space to rise, and in that way works the cylinder partly round. No gas can pass through the chamber until it is completely full. When one chamber has been completely full. completely filled, two things happen: the entering stream of gas now finds an inlet into the succeeding chamber; and, secondly, the gas in the first chamber finds a possible outlet at its opposite end, through a slit which now begins to emerge above water-level. As the cylinder goes on rotating, the first chamber comes to sink under water; water enters the chamber and gas leaves it; and so for each of the four chambers in succession. The axle, thus made to rotate in proportion to the amount of gas delivered, works a train of wheelwork which by means of pointers shows the number of 10,000's, the number of 1000's, and the number of 100's of enlic feet of gas which have passed through the cylinder. The water must be kept at a constant level; it may freeze, for which reason the meter healst be born in a conficiently ways upon the content. should be kept in a sufficiently warm place (not too warm, clse the gas will expand and the meter give too high a reading), or clse a non-freezing liquid should be used; and the water damps the gas. Mechanical contrivances have been added to the wet meter in order to maintain the water-level constant; the meter sometimes shuts off the gas when the water is too low. Thus there may be an automatic addition of water from a subsidiary reservoir, or an automatic maintenance of level by a hinged float which sinks into the water when liquid fails to support it in its uppermost position (as in the constant level inkstands); or, there may be (Warner and Cowan) a contrivance for transferring the excess of gas delivered at each revolution, when the water is too low, back again for measurement. When the meter is driven too fast the record is too low; but backwash in the meter then causes flickering at the jet; and the general use of meters too small for the work which they have to do is con-ducive to leakage in the district within which they abound, on account of the high pressure necessary to force gas through them.

Dry meters are, in principle, a variety of piston-meter; the fluid is measured by displacing a piston or diaphragm, and thereby filling a measured cavity. They consist of two or three separate chambers; each chamber is divided into two by a diaphragm, which may be displaced to one side or the other. The gas is admitted to the one side of this diaphragm until it is displaced to the full extent of its range; when this occurs the gas is admitted to its other side, and the gas previously admitted is allowed to go on to the hurner, and so on alternately. The chambers act alternately, thus passing the dead-points. The diaphragms are connected with wheelwork which record their successive oscillations, and represent on the dials the corresponding number of cubic feet passed through the apparatus. By a British Act of Parliament (the Sales of Gas Act, 1859) all gas-meters must register not more than 2 per cent. in favour of the seller and not more than 3 per cent, in favour of the seller and not more than o per contains the seal the purchaser of gas; and meters must bear the seal of an inspector appointed under the act. Meters of an inspector appointed inder the act. Meters have recently been introduced which enable the poorer consumer to purchase gas by pennyworths on the familiar 'penny in a slit' principle. In Brusscls the gas burned by day and that used at night are registered on different dials of the same

meter.

It is of great importance that in the first place gasfittings should be adequate to supply the maximum demand for gas; and in the second, that the gas should emerge from each burner under a low pressure. If the gashttings—pipes, &c.—be inadequate, as they mostly are, full flames cannot be produced, and the light is unsatisfactory; if, on the other hand, the full pressure of the mains is communicated too directly to the gas-burners them. selves, there is a tendency to flare. This can be unitigated by partially turning off at the meter; but even then the variable demand may result in variable pressures at the burners. There should be a governor for each gas-burner, or for each small group of gas-burners; these are now readily procontable, and when they are used a full flame is obtained which is constantly and steadily kept up by a comparatively slow supply of gas; the incan-descent particles or heavy heated hydrocarbon vapours upon which imministry depends are allowed vapours upon which thinkings, the plane, and the gas is thoroughly birned; and air is not swirled into the interior of the flame by the swift current of gas, thus spoiling the luminosity. An ordinary burner gives greatly superior results when governed; and of late years, since the electric light has caused more attention to be paid to the elicient burning of gas, the burners themselves have been greatly im-proved; but burners should always be selected with reference to the quality of gas to be used in them, The ordinary ratstail burner has long given place

to the latswing and fishtail burners, the former of which are made with a clean slit across the head of the burner; the latter have two passages converging towards one another, the result being that the two streams of gas meet one another and spread out into a flat sheet of flame. The and spread out into a flat sheet of flame. The former use much gas at ordinary pressures, and a very small pressure (4-inch of water just below the burner) is sufficient to bring out the full lighting-power. In hollow-top lurners the pressure is relieved by the gas swirling in a cavity below the ontlet-slit. Burners of these classes should always be selected with steatite tops; metal burners soon rust and spoil the flame. In Argand burners the gas issues through a ring of holes; the flame is tubular, and is surrounded by a chimney; air tubular, and is surrounded by a chimney; air ascends both inside and outside the tubular flame. In Dumas burners the circle of holes is replaced by a circular slit, and a regulator controls the admission of air. These various burners have also been collected in groups to form the so-called sunlights, and so forth; but the recent remarkable progress in gas-lighting has been due to the study of the mutual actions of flames, and to the use of hot air and sometimes hot gas. For example, we have concentric Argand flames (Sugg); porcelain cylinders in the axis of an Argand flame to keep the flame from flickering, to keep up the heat of the flame and also themselves to radiate light when incandescent; burners in which gas from a circular slit plays on the under surface of a percelain globe; and especially regenerative burners of various models, generally with inverted flames, in which the heated products of combustion as they ascend are made to heat the incoming air which is on its way to feed the flamo. The latest of these models is hourly consumpt of 13 cubic feet of gas. The use of globes and shades cuts off a good deal of light; a clear glass globe ents off from 9 to 12 per cent; ground glass about 40: onel older about 10 ground glass about 40; onal globes about 60. Globes should never have a lower aperture narrower than 4 or 5 inches; the ordinary narrow aperture makes a strong draught of air, which materially weakens the brightness of the flame and unsteadies it. Other devices have also been adopted for using gas for lighting; the gas is burned with air in a small

Bunsen burner, and over the flame is fitted a basket of platinum wire (Lewis), or a small hood consisting of the oxide of didyminm and others of the alkaline earths (Amer von Welshach), which emit a brilliant white light on incandescence; or the ordinary flame of gas may be rendered more luminous by passing the gas over melted naphthaline, which it takes up

(Albo-carbon).

For heating purposes coal-gas is now largely employed: mixed with air it produces a smokeless flame and a higher temperature when burned than it does when burned in luminous flames; and so for direct heating the Bunsen burner principle is suitable. But gas produces the same quantity of heat, provided that it is completely burned, in whatever way it is burned. Convenience, their superior cleanliness, may often determine the use of Bunsen flames; but where radiation is expected to come into play, the luminous flame is more effective; hence, for cooking, direct radiation from huminous flames is often preferred (see STOVES). Coal-gas as a fuel for ordinary cooking has the advantage of economy, in so far that it can be turned off when not wanted, and turned on at once; and it is smokeless if properly burned. Of course it ought not to bo left unprovided with a chimney, any more than a coal fire, for the products of combustion would otherwise escape into the room. Gas is used to an increasing extent for ventilation; a well-arranged system of lamps, especially of the regenerative type, will provide the motive-power for carrying away their own products of combustion and, concurrently, for renewing the air of the room. Gas is also now largely used for Gas-engines (q.v.), which are now made up to 100 horse-power. The price of light obtained from coal-gas, as compared with the price of other illuminants, may be ascertained by finding the cost of a candle-hour—the light of one standard sperm candle for one hour—in each case. The following table combines the data of Stevenson Macadam, Letheby, Thompson, Poris, and others:

Price per Candlohour, in thousandths of a penny,

011	· penay.
Edinburgh gas, 28 candle-power, in a 5-feet burner (No. 5); lighting effect = 28 candles; price of gas 8s. 6d. per thousand cubic feet	7.5
Do. in a 4-feet burner (No. 4); lighting effect = 20-8 candles	8·0
Do. 2 n (No. 2); 7 \otimes n	10·8 14·0
Do. 1 " (No. 1); 1 "	21.0
say 2s, for 16-candle gas; burned in Argands	5°6 4°7
Do, burned in Siomens' precision burner Do, "Calorie lamp	3.8
Do. " Schulke's lamp Buschke and	
Wenham	1·9-2·5 1·45
Sperin oil, at 2s. per gallon, in Argands in common lamps	8·7-27·5 55·0
Parailla, at Sd. per gallou, in modern lamps	6.3-8.0
Composite candles, at Sd. 11. Partillin candles, at 61. 11	160 75
Wax candles, at 2s,	401
Electricity in arc lamps, 1500 candle-power, con- suming 500 watts per hour, at 8d. per 1000 watts.	2.6
Electricity in glow lamps, 16 candle-power each, consuming 61 watts per hour, at 8d. per 1000 watts	32

The prices in this table are subject to correction for each locality, because the price of gas varies from place to place, as also does the quality. These variations are due to differences in the price of coal, the cost of the works, and so forth. To give an idea of the distribution of the cost of gas-making, the London Gas-light and Coke Company's accounts may be referred to. There we find the gross cost of manufacture of each 1000 cubic feet of gas sold is 22.531 pence; the residuals—coke, breeze, tar, and ammoniacal liquor—return 10.820d. of this; so the

net current cost of manufacture at the works is 11·711d. for each 1000 cubic feet ultimately sold; the current cost of distribution is 1·776d.; public lighting involves an outlay of 0·400d.; rates and taxes come to 2·190d.; management to 0·801d.; various charges, including bad debts, amunities, testing stations, legal expenses, &c., come to 0·505d.—altogether 17·443d.; which meter rents (0·758) and miscellaneous receipts for work done, &c. (0·115), bring down to 16·570d. The average price of the gas sold is 30·345d.; the difference, 13·775d. per thousand on a sale of 9,063,735,000 cubic feet in six months, corresponds to a gross profit of just over 10 per cent, per annum on the paid-up capital of £10,289,000. The capital value of the works of this company in July 1889 was £10,342,000, 11s. 7d.; that of the South Metropolitan Company was £2,690,553, 3s. 6d.; and that of the Commercial Company, £808,398, 4s. 1d.

The risks of gas-lighting are twofold—explosion and poisoning. Explosion cannot occur until there is about 6·6 per cent. of gas in the air, but it is dangerous to 'look for a leak with a light.' As to poisoning, tho gas must escape into a room without

The risks of gas-lighting are twofold—explosion and poisoning. Explosion cannot occur until there is about 6'6 per cent. of gas in the air, but it is dangerous to 'look for a leak with a light.' As to poisoning, the gas must escape into a room without being noticed until there is about one-half per cent. of carbouic oxide—i.c. from 4 to 12 per cent. of coal-gas—in the air of the room, before danger to life becomes imminent; and this percentage is rarely attained by ordinary escapes into rooms of fair size. Fatal accidents have generally happened from escapes into small rooms, and also from the travelling of gas from broken mains through earth into an earth-floored house, which, being warm, may act as a chimney and draw the earth-gases through it in a decolorised condition. This last has occurred more frequently on the Continent than in Great Britain. A gas-escape is most likely to be serious in its consequences when it takes place into the upper part of a room; the percentago near the ceiling may then come to be much greater than it is at first lower down (see Poisons).

From 1639 onwards the attention of scientific menhad repeatedly been tunned to 'hurning springs' or streams of 'inflammable air' issuing from wells and mines in the coal districts of England, and communications on the subject were addressed to the Royal Society of Lundon. Some time before 1691, the Rev. Dr John Clayton, Dean of Kildare, addressed a letter to the Hon. Robert Boyle, in which he described experiments on the production and storage of inflammable gas distilled from coal; and this letter was published in the Royal Society's Transactions for 1739. In 1787 Lord Dundomald made some domestic experiments on lighting by coal-gas. In 1792 William Murdoeb hit up his house and office at Redruth in Cornwall; in 1798 he lit up a part of Boulton & Watt's manufactory at Soho, Birmingham; and in 1805, with 1000 burners, the wills of Messrs Phillips & Lee at Salford. In 1801 Le Bon lit his house with coal-gas, and in 1802 he proposed to light a part of the city of Paris. In 1803 Wintzer or Winsor lectured in London upon the new light; he was a sanguine projector, holding forth fantastic hopes, but was instrumental in founding the Charterod Gas Company which obtained its Act of Parliament in 1810. In 1813 he was replaced by Mr Sannel Clegg, who had been managing Boulton & Watt's gas-lighting since 1805 in succession to Mr Murdoch, and who was the inventor of the hydraulic main, the wet meter, and the wetline purifier. In 1813 Westminster Bridge was lighted by gas, and immediately thereafter the new method of lighting made very rapid progress, not only in London, but throughout Great Britain and other countries; and in the contest for supremacy between coal-gas and oil, wood, and peat gas, which were at one time somewhat extensively tried, coal-gas took the leading place, to the

exclusion of its competitors. In most important places in the United Kingdom, the gas werks have been acquired by the local authorities on behalf ef the public, few of the larger gas-works being left in the hands of gas cempanics.

The leading work on coal-gas is that of King, edited by Newbigging, whose Gas Managers' Handbook is also full of valuable detail; Wanklyn's Gos Engineer's Chemical Manual, for chemistry; and for statistics, Field's Analysis, and the Gas World Yearly Analyses of Gas Companies' and Corporations' Accounts.

II. Oil-gas is prepared from heavy mineral oils (sp. gr. = 0.9) or paraffins, and from the residues from the distillation of these, and in some cases from spent grease, from suint, &c. In Australia it is made from waste mutton fat. One hundred 1b. of oil yield from 722 te 1092 cubic fect of gas, of which one cubic foot per hour yields a light of 10 to 12 candles. The oil is made to flow in a thin standy drawn into act in the satisfact of the product of th to 12 candles. The oil is made to flow in a thin steady stream into cast-iron retorts, heated to between 900° and 1000° C.; these retorts are herizontal or vertical, or are in some cases so arranged that gas formed in one retort or section of a retort is further heated in another retort er in another section of the same retort. The condensation of second of the same refort. The contensation of oil-gas requires special attention; oil-gas has a tendency to carry non-permanent vapours with it, and these must be removed. The purification of oil-gas necessitates the use of scrubbers, purificis, and so on, as in coal-gas. In respect of the sulphiretted hydragen it may be incidentally noted that Mr Bell has shewn that even in rofined parafin and petroleum oils there is sulphire present often for in excess of that centained in an equivalent quantity of coal-gas. Oil-gas must be burned at a low pressure and in small burners; the standard burner is No. 1 (1 cubic foot per hour). Oil-gas is used for lighting railway carriages; the gas, carefully purified, is compressed at 10 atmospheres pressure; it is then transferred to the reservoirs here but the railway carriage of their carries, at 6 atmospheres' pressure, enengh gas for 33 to 40 hears' lighting; a regulator governs the pressure at the burners, and each burner, consuming 0.757 which for the pressure at the burners, and each burner, consuming 0.757 which for the pressure at the consuming of the pressure of the pressur suming 0.777 cubic feet per heur, gives 7 candle-light. Cempressed eil-gas has also been applied to the lighting of bueys, and to some extent to steamship lighting.

III. Peat-gas and IV. Wood-gas are eccasienally used. Wood-gas is a by-product in the preparation of pyreligueous (crude acetic) acid; its lighting power is about 20 candles; the yield is 546 to 642 cubic feet per 1000 lb. of weed; of the crude gas, 20 to 25 per cent. consist of carbenic acid. Peat yields 320 to 500 cubic feet of gas per 100 lb.; lighting-power about 18 candles; the carbenic acid in

the crude gas is about 30 per cent.

V. Producer Gas.—When a limited stream of air is driven through glowing coke, the coke is first burned to carbonic acid; the carbenic acid, as it travels through the remainder of the brightly glowing coke, takes up carbon and, for the most part, becomes carbonic oxide; the resultant gaseons mixture consists of carbonic oxide (about 26 per cent.), the nitrogen of the air employed (about 70 per cent.), and some undecomposed carbonic acid (about 4 per cent.). This mixture is combustible with a clean flame, and this kind of fuel is now largely employed (generally with utilisation of the west beet to warm the incoming augment of cities. waste heat to warm the incoming current of air, as in the so called regenerative furnaces) for heating the retorts in coal-gas-making, in metallurgical operations, in glass and pottery making, and in boiler firing. The furnace learth becemes a clear, believing. The furnace hearth becomes a clear, clean, deoxidising region of intense heat without visible flame. The gas from the preducer is very het; if it be passed at once into the furnace, a large preportion of the heat of the ceke may be utilised;

if it be allowed to cool, a considerable percentage is lost. The usual yield of producer gas is from coal (Siemens) about 160,000, from cake about 175,000 (Siemens) about 160,000, from coke about 170,000 cubic feet per ton; the heating values are, for cooled gas, respectively 29,700 and 26,900 calories per thousand cubic feet, or altogether 60 and 68 per cent of those of the respective materials employed.

VI. Producer Water-gas.—When mixed air and steam are driven through glowing coke (or anthracite, Dowson), the air keeps the coke glowing, and,

carbonic acid, and nitrogen; the steam acts on the glowing coke and produces hydrogen and carbonic oxide; the result is a mixture whose composition oxide; the result is a mixture whose composition varies according to the relative quantities of air and steam, and according to the temporature in the producer; as an average it may be said to consist of 9 per cent. of carbonic acid, 24 of carbonic oxide, 13 of hydrogen, and 54 of nitrogen. If an excess of steam be used, there is more hydrogen, more carbonic acid, and less carbonic oxide. The period of the steam with its about 168 000 carbonic foot are too. usual yield is about 168,000 enlie feet per tou of material; the heating value is about 33,500 calories per 1000 cubic feet; altogether about 80 per cent. of that of the coke and anthracite employed. This

process is continuous.

process is continuous.

VII. Water-gas.—In 1793 Lavoisier discovered that when steam, unmixed with air, is passed through glowing coke, the coke is oxidised; carbonic oxide and hydrogen gas are produced, theoretically pure and in equal volumes; practically, the product contains 3 to 7 per cent. of carbonic acid, and 4 to 9 of nitrogen. The yield is from acid, and 4 to 9 of nitrogen and about 35,000 cubic coke (7,000,000 caleries per ton) about 35,000 cubic feet, with a heating value of about 75,000 calories per 1000 enhic feet, or on the whole about 40 per cent. of the heat-value of the cake; from enal (7,800,000 calories per ton) about 42,000 cubic feet, at 92,000 calories, or about 40 per cent. In the process the steam cools down the glowing coke; consequently air must be sent through the coke at intervals (about 4 minutes steam and 10 minutes air) in order to restore its glow; and a series of air) in order to restore its glow; and a sories of producers must be so conjoined as to act alternately with one another, before the process can result in a continuous supply of watergas. The by-producer, producer gas, which may be produced in large quantities (110,000 cubic feet, at 26,000 calories per 1000) by regulating the supply of air while the eeke-glow is being worked up, may be used for boilers or for gas-engines. When it is so ntilised, the net cost of making simple watergas is ised, the net cost of making simple water gas is between 5d. and 6d. per 1000 cubic feet, about 6d. per 1000 less than coal-gas. Water gas gives on combustion an appearance like. per 1000 less than coal-gas. Water-gas gives on combustion an extremely high temperature, which saves time in furnace work; gold, silver, and copper, and even an alloy of 70 parts of gold and 30 of platinum are readily melted in quantity by it; hence for bringing objects such as Falmelighm's cembs (a series of rads of magnesia) into brilliant lumineus incandescence, for wolding, or for metallurgical operations involving high temperathe taturgical operations involving high temperatures, it is very suitable; and in gas-engines it works cleanly. When water-gas is used with Fahnehjelm combs, the quantity of gas used is (Dr F. Fischer) 180 litres, or 6½ cubic feet per hour, the light being, when the burner is now, 22 to 24 candles, and after 60 hours, reduced to 16. The combs (16s, per hundred) require result of the 100 hours have here. dred) require renewal after 100 hours' use. As a carrier of heat, coal-gas is twice as effective in respect ef quantity of heat; its heating-power is about 150,000 calories per 1000 cabic feet, which represents about 20 per cent. of the whole heat of the coal distilled, or about 50 per cent, after allowing for the heating-power rotained in the coke, breeze and far any this account ratios of heating. breeze, and tar; and this concentration of heating-power in smaller bulk may in some cases transfer the advantage of cheapness, through smaller cost

of distribution, to coal-gas. Water-gas is much nsed in the United States. It is supplied to houses, either pure or mixed with the coal-gas produced in the manufacture of the coke from which the water-gas is made, and it is then known as 'fnel-gas;' but more generally it is carburetted by being exposed to a high temperature along with naphtha or posterior a ngh semperature along with hapithit in petroleum vapours, and the resultant mixture is employed as illuminating gas. Unfortunately the high percentage of carbonic oxide, which is odourless, has eaused the death-roll due to water-gas to be a very high one in America. In New York, Brooklyn, and Baltimore the average yearly number of deaths from gas-poisoning before water-gas came in was 1.2; since then it has been 16, eyen though in these towns the gas is provided with a

heavy earline tetal smell.

VIII. Natural Gas.—This issues from the earth in many places—the immortal fires at Baku (q.v.), for example; gas-wells in other parts of the Cancasas, hoth natural and opened up in the course of boring for oil; some in China which are said to have been ribilised; but principally in North America. At Fredonia, New York state, gas escaping from the earth has been used to a small extent since 1821. In 1859 boring for oil in Pennsylvania and elsewhere became general; the gas associated with the oil was looked upon as a disadvantage, and was conveyed to a safe distance and there burned. The conveyed to a safe distance and there barned. The general utilisation of the gas began in 1872 at Fairview, Butlor county, Pennsylvania. Many of the gas-wells lasted only four or five years; some then sunk are still in action. In 1874 the gas was first used in iron-smelting and puddling by Spaug, Chalfant, & Co., whose example was followed by the Pittsburg ironmasters about 1833. One company uses a million cubic feet per hour in smelting; another uses gas equivalent to 400 tons of coal a day; and to some places the gas is carried 60 or 70 day; and to some pinces the gas is carried 60 or 70 miles by pipes. Pittsburg happens to lie in the centre of a gas area, and the result is, not to speak of the financial results, that Pittshurg, formerly lying under a continuous black pall of smoke, is bright and clear, and peaches now ripen in its gardens. Natural gas is also found, mostly by gardens. Natural gas is also found, mostly by boring, in other districts in Pennsylvania, in Ohio, Indiana, Kentucky, Illinois, Kansas, Dakota, and at Los Angeles in California. The amount of gas used in the United States in 1888 was considered to have taken the place of 14,163,830 tons of eoal (valued at \$12,543,830); of the total, natural gas equal as fuel to 12,543,830 tons of eoal was consumed in Pennsylvania. The North American gas consists mainly of marsh-gas; sometimes it contains nothing else than marsh-gas and a little carbonic acid; sometimes there are various perceutages of hydrogen, ethylene, traces of earhonic oxide, nitrogen, oxygen, or heavy hydrocarbons. The Bakn gas contains 3 per cent. of heavy hydro-The American gas contains a per cent. of nearly hydrogen, carbons, and is more regularly deficient in hydrogen. The American gas is used for all metallurgical processes except the blast-furnace, and it is found very convenient for glass-making. In some towns very convenient for glass-making. In some towns where luminous natural gas is available, the public lighting is carried on, for the sake of economy, both day and night; in other places the gas is carburetted or used with Fahnehjelm's combs. In 1889 the supply was said to be showing signs of exhaustion; whatever be its duration it will have given an engrous impatus to the practical use given an enormous impetus to the practical use of gaseous fuel and to smokeless firing. Natural gas may possibly undorlic the English salt-beds.

Gascoigne, SIR WILLIAM, an English judge, born perhaps as early as 1340, was appointed, on the accession of Henry IV., a justice in the Court of Common Pleas, and in November 1400 was raised to be Chief-justice of the King's Bench. He was evidently a fearless and independent judge, as

he refused to obey the king's command to sentence to death Archbishop Scrope and Mowbray, the Earl Marshal, after the northern insurrection in 1405; maintaining that the former was not subject to any civil tribunal whatever, while the latter had the right to be tried by his peers. Nine days after the death of Henry IV. a successor was appointed to his office, which effectually disposes V. continued him in it, as expressed in splendid lines by Shakespearo in the second part of *Henry IV*. (V. ii. 102–121). Clascoigne died in 1419. His name will always live in the famous story of his name will always hive in the famous story of his encounter with the dissolute young prince Hal. Unfortunately it lacks historical support, there being no record of the story in the Controlment Rolls of the King's Bench, while Mr H. H. S. Croft and Mr F. Solly Flood believe it an anaelmonism originating in the misapplication of the entry on the Rolls of 33 and 34 Edward I, according to which the dissolute vegue wines afterwards. which the dissolute young prince, alterwards Edward II., had been expelled from the court for half a year, for an insult offered to one of his father's ministers. The story, as ascilled to Prince Hal, first appears in The Boke named the Governour (Book II. chap. vi.) of Sir Thomas Elyot, first printed in 1531. The prince, hot with anger at the arrest and arraignment for felony of one of his servants, burst into court, and when commanded servants, burst into court, and when commanded to retire, came furiously up to the hench as if to slay or strike the judge, who, without moving, committed him to prison. The young prince, at once brought to his senses by the calm gravity and conrage of the judge, submitted; and the king, when he heard of it, exclaimed: 'O merciful God, how much am I, above all other men, bound to your juditic goodness; Specially for that ye have given infinite goodness; specially for that ye have given me a judge who feareth not to minister justice, and also a son who can suffer semblably and obey justice. Hall, actually a contemporary of Elyot, has the story also, and after him Holiushed, although none of the three, like Shakespeare, mentions the judge by name. Mr Croft concludes that the story may have been transcribed from the MS. of some unknown chronieler, most probably a monk, who was well content to narrate any story to the credit of a judgo who had vindicated tho privileges of the elergy, and of a king like Henry V. who had heaped the church with substantial benefits.

105

See vol. ii. (pp. 60-72) of Mr H. H. S. Croft's edition of Elyot's Boke named the Governour (2 vols. 1880), and chap. iii. of Rev. A. J. Church's Henry V. (1889).

Gasconade, a river of Missouri, winding 200 miles north-eastward through a hilly and picturesque country, till it joins the Missouri River, 35 miles below Jefferson city.

Gascony (Lat. Vasconia), an ancient district in south-western France, situated between the Bay of Biseay, the river Garonne, and the Western Pyrences, and now included in the departments of Landes, Gers, Hautes-Pyrénées, and the southern portions of Haute-Garonne, Tarn-et-Garonne, and Lot-et-Garonne. Its subdivisions were a number of smaller districts, of which the best known were Les Landes (chief place, Dax) and Labourd (Bayonne). The total area of Gasony is over 10,000 sq. m.; its inhabitants, numbering about a million, have preserved not only their dialect and customs, but even their distinct individuality alike in outward aspect and in their good-natured The Gascon is little in stature and thin, but strong and lithe in frame, with fine eyes and high colour. He is ambitions and enterprising, but passionate and given to boasting and exaggeration. Hence the name Gasconade has gone into literature as a synonym for harmless vapouring. The Gascons, moreover, are quick-witted, cheerful, and

per-cycring, and make capital soldiers. This is e-pecially true of the Gascons in the Gers depart-This is ment; the peasants of the Landes, living in mud-luts, are extremely ignorant and rude in their

manners, but yet are honest and moral.

Gascony derived its name from the Basques or Vasques, who, driven by the Visigoths from their own territories on the southern slope of the Western Pyrenees, crossed to the northern side of that mountain-range in the middle of the 6th century, and settled in the former Roman district of Novempopulana. In 602, after an obstinate resistance, the Basones were forced to submit to the Franks. They now passed under the sovereignty of the dukes of Aquitania (q.v.), who for a time were independent of the crown, but were afterwards conquered by King Pepin, and later by Charlemagne. Subsequently Gascony became incorporated with Aquitaine, and shared its fortunes.

See Monlezun, Histoire de la Gascogne (6 vols. Auch, 1846-50); Cénac-Moncaut, Littéraure populaire de la Gascogne (Paris, 1868); and J. F. Bladé, Contes populaires de la Gascogne (3 vols. Paris, 1886).

Gas-engine. Gas-engines are heat-engines of a type in which the fuel is combustible gas, which is burned within the engine itself. In all heatengines there is a working substance, which is alternately heated and cooled, and does work by alternate expansion and contraction of its volume, thereby converting into mechanical form a portion of the energy which is communicated to it as heat. In most heat-engines the combustion of the fuel which supplies heat to the working substance goes on outside of the vessels within which the working on dustrie of the vesses within which the working substance is contained; the steam-engine is a char-acteristic example of this class. Gas-engines, on the other hand, belong to the internal combustion class: the working substance is made up of the fuel tivelf—before and after combustion—along with a certain quantity of diluting air. Internal combustion engines have the enormous advantage that there is no heating surface of metal through which the heat must pass on its way to the working substance. The existence of a heating surface in the external combustion engino imposes practically a somewhat low limit upon the highest temperature to which the working substance may be raised. In gas-engines a far higher temperature is practicable, and the result is that it becomes possible to convert a larger fraction of the heat into work. The theory of Thermodynamics (q.v.) shows that even the most efficient conceivable heat engine can convert into work no more than a certain fraction of the heat supplied to it-a fraction which is increased by increasing the range through which the tempera-ture of the working substance is caused to vary. This range is much greater in the gas-engine than in the steam-engine, and the ideal efficiency—that is to say, the fraction of the heat convertible into work—is consequently greater. In practice, although the gas-engine as yet falls short of its ideal efficiency to a much greater extent than does the steam-engine, it is actually the more efficient of the two. A pound of fuel converted into gas and used in a modern gas-engine gives a hetter return in mechanical work than if it were burned in the furnace of a steam-engine of the most economical type. For small powers the gas-engine has the great practical merit, as compared with the steam-engine, of dispensing with the attendance which a boiler and furnace would require. This consideration has made it in many thousands of eases an economical motor even when the gas it uses is of the comparatively costly kind supplied for illumination. inating purposes.

From the year 1823 onwards a number of proposals were made by Brown, Wright, Barnett, and

others for the construction of engines to work by the explosive combustion of gas. Although in some instances these inventions anticipated later successful engines, and although the details were often carefully elaborated, no practical snecess was attained till 1800, when an effective gas engine was brought into public use by M. Lenoir.

Lenoir's engine resembled in appearance a singleeylinder horizontal steam-engine. As the piston advanced it drew in an explosivo mixture of gas and air. About mid-stroke this was ignited by an electric spark, and for the remainder of the stroke work was done through the pressure of the hot products of the explosion. During the back-stroke these products were expelled to the atmosphere, while on the other side of the piston a fresh explosive mixture was being taken in and exploded at mid-stroke as before. To keep the cylinder cool enough to admit of Inbrication it was surrounded by an external easing within which end water was caused to circulate. This water-jacket has continued to be a feature of nearly all modern gasengines. An indicator-diagram from Lenuir's engine is shown in fig. 1. From A to B the gas and air are

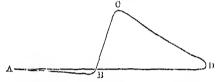


Fig. 1.—Indicator-diagram of Lenoir's Engine.

being sneked in. The rapid rise of pressure from B to C is due to the ignition of the mixture. After C the hot products of combustion go on expanding to the end of the stroke, D, and the pressure diminishes although (as recent investigations have shown) the process of combustion is to some extent continued into this stage. The luck-stroke, DA, expels the

into this stage. The lack-stroke, DA, expels the burned gases at atmospheric pressure. Lenoir's ongine used about 95 cubic feet of gas per horse-nower per bour, which is about five times the quantity required by the best gas-engines of the present day. Its poor economy was mainly due to the small amount of expansion which the hot gases underwent after the explosion. Another drawback was that the average pressure upon the piston was so low as to make the engine bulky in proportion to the work performed by it. These defects are remedied in modern gas-ongines by compressing the mixture before it is as by compressing the mixture before it is exploded, so that a greater range of expansion is required to reduce the burned gases to the atmospheric pressure at which they are expolled. shell presente as when they are experient. This secures greater efficiency, while at the same time the higher mean effective pressure of the working substance permits an engine of a given size to have more power. Compression of the exto have more power. Compression of the ex-plosive mixture had been proposed by Barnett as carly as 1838, and was a feature in several later patents; but its advantages were first practically realised in the well-known and highly successful

Nine years earlier (in 1867) a gas-engine had been commercially introduced by Otto in conjunction with Langen which, although now obsolete, deserves mention both on account of the success which it achieved and the peculiarity of its action. The Otto and Langen engine was of the free-piston type (originally proposed by Barranti and Matteneci in 1857). There was no compression of the explosive mixture; it was taken in during the early part of the up-stroke of a piston which rose in a vertical cylinder. Then the mixture was ignited by boing brought into momentary contact with a

flame through the action of a special slide-valve. Under the impulse of the explosion the piston rose with great velocity to the top of its stroke, being free to rise without doing work on the engine shaft. The burned gases then cooled, and their pressure fell below that of the atmosphere. The piston was therefore urged down by the pressure of the air, and in coming down it was automatically put into gear with the shaft, and so did work, the products of combustion being expelled during the last part of the down-stroke. The engine was excessively noisy, but it took less than half the amount of gas

that had been taken by Lenoir.

Otto's invention of 1876 again halved the consumption of gas, and quickly raised the gas-engine to the position of a commercially important motor. Its success may be judged from the fact that in 1889 there were some thirty thousand engines of this type in use, of sizes which give from 100 horse-power down to a fraction of I horse-power. In the Otto ongine the cylinder is generally horizontal and single-acting, with a trunk piston, and it takes two revolutions of the erankshaft to complete a cycle of operations. During the first forward strake gas and air are drawn in, in the proportion proper to form an explosive mixture, During the first backward stroke the mixture is compressed into a large clearance space behind the piston. When the next forward stroke is about to begin, the compressed mixture is ignited, and work is done by the heated gases during the second forward stroke. The second backward stroke completes the cycle by eausing the burned gases to be expelled into an exhaust-pipe leading to the onter air. The clearance space is, however, left full of burned gases, and this portion of the previous charge is allowed to mix with the fresh air and gas which is allowed to mix with the fresh air and gas which is drawn in during the first forward stroke of the next cycle. Since only one of the four strokes which are required to complete a cycle is effective in doing work, a massive fly-wheel, running fast, is used to furnish a large magazine of energy, and in portant—as, for instance, in electric lighting—it is usual to have two heavy fly-wheels. A centrifugal governor controls the engine by cutting off the sunnity of one when the sured exceeds a prescribed supply of gas when the speed exceeds a prescribed limit. The cylinder is kept moderately cool by the circulation of cold water in a water jacket; and the usual means of igniting the charge is a slide-valve, the construction of which is described below.

The general appearance of an Otto engine, as made by Messrs Crossley Brothers, is too well known to need an extended description. It resombles a single-cylinder horizontal steam-engine, heavily built and mounted on a somewhat high bed-plate.

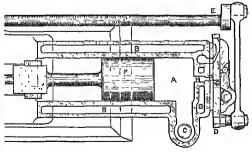


Fig. 2.—Section through Cylinder of Otto's Engine.

In the smallest forms a vertical arrangement of the cylinder is adopted, and for the largest powers a pair of horizontal cylinders are set side by side. Fig. 2 shows some of the principal details by a horizontal section through the cylinder. The piston, P, appears in the figure at the back end of its stroke, and the space A is the clearance. Its volume is usually from two to three fifths of the volume swept through by the piston. BBB is the water-jacket. C is the exhaust-valve, which is opened by the action of a revulving cam during the second back-stroke of the cycle. The slide valve, D, is made to slide backwards and forwards across the back end of the cylinder by means of a connecting-rod driven by a short crank on the lay-shaft, E, which is driven by bevel or screw gear from the main shaft, so that it turns once for two revolutions of the main shaft. This valve serves to admit gas and air, and also to carry an igniting flame to the mixture after compression in the cylinder. An igniting jet is kept burning at F, behind the valve. In the valve there is a small chamber, G, supplied with gas, and as this passes the jet it ignites and continues burning until by the further movement of the valve the chamber, G, communicates with the cylinder through the opening H, by which time the back of the chamber is closed. In a number of recent Otto engines the ignition of the mixture is brought about in a different way. There is a short tube closed at one end and communicating at the other with the cylinder, through a valve. The tube is kept red-hot by a Bunsen-flame playing round it, and at the proper moment a portion of the charge within the cylinder is allowed access to the red-hot tube through the valve.

Fig. 3 is a copy of an indicator-diagram from an Otto engine. All is the first stroke of the cycle,

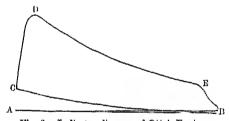


Fig. 3.—Indicator-diagram of Otto's Engine.

and corresponds to the taking in of gas and air at a pressure sensibly the same as that of the atmosphere. BC is the compression stroke. At C ignition takes place and raises the pressure quickly to D. CDEB is the effective forward stroke, and the exhaust-valve is opened for the escape of the waste gases near the end of this stroke at E. The expulsion of the gases goes on from B as the piston moves back to A, and this completes the cycle.

There are now a number of other successful gasengines which more or less resemble Otto's. In Clerk's engine a similar cycle is performed, except that there is an explosion at each forward stroke. The waste gases escape through exhaust-ports near the front end of the cylinder, which are uncovered by the advance of the piston, and a displacer cylinder or pump immediately forces in a fresh mixture, which is compressed during the return stroke. In Andrew's (the Stockport) engine, and in Robson's (made by Messis Tangye), an impulse in every revolution is secured by compressing the explosive mixture in a pump, which in some cases is supplied by using the front end of the working cylinder itself for this purpose. In the 'Griffin' ongine (Messrs Dick, Kerr, & Co.) explosion occurs at both ends of the cylinder, but only at every third stroke: the cycle includes the drawing in and rejecting of a 'seavenger' charge of air, as well as the drawing in and compression of the explosive mixture and the rejection of the burnod gases. A recent engine

possessing much originality is Atkinson's, the disfinctive features of which are shown in fig. 4. Here the piston acts on the crank-shaft not directly but the piston acts on the crank-shaft not directly but through a toggle-joint, which has the effect of compelling the piston to make four single strokes for cylindors, driving back both pistons, and undergoing further expansion. Meanwhile the other cylinder has taken

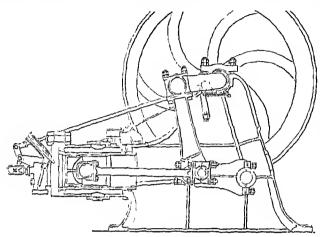


Fig. 4.-Atkinson's Gas-engine.

one revolution of the shaft. The four strokes are of different lengths. In the first forward stroke the piston starts from the back end of the cylinder and stroke, compressing the mixture into a space not swept through. Then the mixture is fired, and work is done during another and considerably larger forward stroke, and finally the cycle is completed by a return stroke, which is long enough to completely expel the burned gases. The mixture is ignited by means of a red-hot tube, but in this case there is no valve to control the time of firing; it is determined simply by the compression of the explosion of the explosio sive mixture against a cushion of waste gas in the top of the tube. Fig. 5 is an indicator-diagram from Atkinson's engine. AB is the admission stroke. From B to C the explosive mixture is compressed; at C it is fired, and the effective working stroko, CDE, begins. Its length is more than twice that of

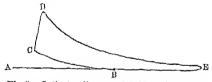


Fig. 5.—Indicator-diagram of Atkinson's Engine.

the compression stroke. In the long return stroke, EA, the products of combustion are wholly expelled, except for a small quantity contained in the clearance space, which is no greater than the clearance necessarily left behind any piston. This complete (or, to be more exact, nearly complete) expulsion of the burned gases is a good feature in Atkinson's cycle but the post distinction. cycle, but the most distinctive merit is the relatively long working stroke, which secures much expansion, so that the gases do not escape until their pressure falls to a value not greatly exceeding that of the atmosphere, and at the same time makes the expansion occur quickly, giving the hot gases com-paratively little time to part with their heat to the lining of the cylinder.

Messrs Crossley have lately introduced a modified form of Otto engine, with two equal cylinders, the pistous of which make their strokes simultaneously. The mixture is compressed, exploded, and expanded first behind one piston; then the products of com-

> in a fresh charge, which is now compressed behind its piston, and is exploded when the next forward

stroke begins.

During the explosion in a gas-engine cylinder the highest value of the pressure is usually from 180 to 200 lb. her square inch, and the highest temperature is about 3000° F. The process of explosion is by F. The process of explosion is by no means instantaneous. After ignition the pressure and temperature rise with great rapidity, as the indicator-diagrams (figs. 3 and 5) show, but combustion is not complete when the highest point in the diagram has been reached. about 60 per cent, of the whole heat which the combistion of the gas should yield is developed up to that During the subsequent expoint. pausion a slow process of continued combustion goes on, in which a considerable part of the remaining

40 per cent. is set free; but even when the contents of the cylinder escape to the exhaust the process is generally still incomplete. The afterhroning, as it is called, which occurs during expansion, after the point of highest pressure has been passed, has the effect of keeping the pressure of the expanding gas from falling so fast as it otherwise would fall. But for this the expansion curve on the indicator-diagram would fall the recognition of the control of expansion curve on the indicator diagram would fall very rapidly, owing to the cooling of the gases through their contact with the cylinder walls. During expansion the gases are parting with much heat to the walls, but the after burning supplies nearly enough additional heat to make good this loss—sometimes, indeed, more than enough—and the result is that the form of the expansion curve does not differ very materially from that of an adiabatic line. The experiments of Mr Dagald Clerk, who has taken much using to investigate Clerk, who has taken much pains to investigate this action, show that the time-rate of the explosion depends greatly on the richness of the explosive mixture. When the mixture is much diluted the process is so slow that the point of highest pressure is not reached until far on in the stroke.

Though the maximum temperature within the cylinder is materially reduced by this want of perfect suddenness in the combustion of the gas, it is still so high that in engines of even very moderate size a water-jacket is essential. The actual maximnm temperature of the gases is in fact higher than the melting-point of cast-iron, while the temperature of the metal has to be kept low enough not to burn The water-jacket involves an immense waste of In the most favourable cases it absorbs 27 per cent. of the whole heat which would be produced by complete combustion of the gaseous mixture, and more generally the amount it absorbs ranges from 40 to 50 per cent. The best existing gas-engines succeed in converting into work about 22 per cent. of the whole potential energy of the fuel; of the remaining 78 per cent. a half or more generally goes to heat the water which circulates in the jacket, and the remainder is rejected in the exhaust, partly through incomplete combustion, but mainly in the form of actual heat, on account of the high temperature at which the waste gases escape. Attempts have been made to save a part of this loss

by the application to gas-engines of the regenerative principle which has done so much to promote economy of heat in metallurgical operations. It was proposed by Siemens to use a separate combustion chamber, which, being distinct from the working cylinder, might be kept always hot, and to pass the outgoing gases through a regenerator, which would take up their heat and give it back to the incoming air. Much the same end was aimed at by Fleeming Jenkin, who tried to adapt the regenerative engine of Stirling (see AIR-ENGINE) to serve for the internal combustion of gas. These attempts have hitherto failed, and the gas-engine still falls far short of the limit of thermodynamic efficiency which its high range of temperature shows it to be theoretically capable of. The greatest ideal efficiency of any heat-engine is measured by the fraction $\frac{\tau_1 - \tau_2}{\tau_1}$, where τ_1 is the highest (absolute) temperature at which it can reject heat. The highest temperature in the combustion is, as we have seen, about 3000 F., and the lewer limit of the range is the atmespheric temperature, or say 60° F. Substituting these values in the formula, we have 0°S5 as the highest ideal officiency; in other words, it should be, from the thermodynamic point of view, theoretically possible to convert 85 per cent. of the leat-energy of the gas into work. The greatest efficiency hitherto realised is about 0°22, or little more than ene-fourth of the ideal efficiency. It must not be supposed that under any imaginable practical conditions it eeuld be possible to reach the ideal limit, but it may be confidently expected that the gas-engine of the future will approach it nucl more closely than does the gas-engine of toolwy. The comparison serves to show how much room there is for invention in the direction of obvicating what is essentially preventable loss.

It is instructive in this connection to compare the efficiency of gas-engines with that of steamengines. In a large steam-engine the efficiency is about 0.15; in other words, the engine converts into work only some 15 per cent, of the heat-energy supplied to the steam, and the figure would be greatly less if one stated it as a fraction of the whole heat of combustion of the fuel. In steamengines small enough to be fairly comparable with actual gas-engines, the efficiency is rarely more, and generally a good deal less, than 0.1. Considered as a thermodynamic machine, the gasengine, imperfect as it admittedly is, is already not far from twice as officient as the steam-engine. It is in fact the most officient heat-engine we

possess.

Experiments show that the censumption of gas in practice in a small gas-engine (indicating 10 lerse-power or more) may, in favourable cases, be less than 20 cubic feet per hour per indicated horse-power, including tho gas which is consumed in maintaining the igniting flame. Of the indicated horse-power about 85 per cent, is available for doing mechanical work outside of the engine itself. The cost of the fuel is necessarily high so long as the gas supplied to the engine is the purified ceal-gas used for lighting. Thus, with gas costing 3s. per 1000 cubic feet, the supply required for each indicated horse-power per hour will cost about three-farthings, whereas the ceal bill of a steamengine for each horse-power hour need not exceed a fifth of a penny, and may be even less. In such cases the advantage of the gas-engine lies in its compactness and convenience, in the saving of charges for attendance, and in the case and contermittent work. Economy in the cost of fuel may, however, be secured by supplying the engine

with a cheaper kind of gas, a gas suitable for heating though not suitable for illumination. The late Sir William Siemens pointed out that a comparatively cheap gas of the kind required might be got by separating successive stages in the distillation of coal, and urged the desirability of supplying tewns with such a gas for heat and power through mains distinct from those already in use. A public supply of water-gas has also been proposed, Another cheap gas which has been very successfully used in gas-engines is the gas preduced by Mr Emerson Dowson's process of blowing a mixture of air and steam through a bed of red-het anthracite or coke. The product contains 22½ per cent. of hydrogen and the same quantity of carbonic oxide, mixed with much nitrogen and a small quantity of carbonic oxide, mixed with much nitrogen and a small quantity of carbonic acid, and is said to cost about 2½d, per 1000 cubic feet. The engine requires about four times as much of it as it would require of illuminating coal-gas. When Dowson gas is used, the consumption of fuel in supplying a gas-engine is found to be not more than 1½ lb. of coke or anthracite per horse-power per hour—a result that compares most favourably with the 4 er 5 lb. usually hurned in a steam-ongine of correspending size. Even the best large steam-engines de not achieve so great an oconomy of fuel.

A notice of gas-engines would be incomplete without achieves to self-water and contact and incomplete without achieves to self-water and contact and incomplete without achieves to self-water and we would be incomplete without achieve the self-water and we would be incomplete without achieves to self-water and we would be incomplete without exchanges as a self-water and we would be incomplete without exchanges as a self-water and we would be incomplete without exchanges as a self-water and we would be incomplete without exchanges as a self-water and we would be incomplete without exchanges as a self-water and we would be incomplete.

A notice of gas-engines would be incomplete without a reference to oil-engines, using petroleum as fuel, which is vaporised and then exploded along with air. In Priestman's engine the petroleum, which is a safe oil with a flashing-point higher than 75° F., is injected in the form of spray, by a jet of compressed air, into a chamber which is heated by means of a jacket through which the hot gases of the exhaust pass. There the spray is raised to a temperature of about 300°, and is completely vaporised. From the hot chamber the vapour is drawn, along with mere air, into the working cylinder, where the cycle of operations is essentially the same as in Otto's engine. In the most recent forms of this very promising metor, only 12 lb. of eil is burned per brake horse-power per hour.

1b. of eil is burned per brake horse-power per hour.

References.—D. Clerk, The Gas-engine (1886); W.

MacGregor, Gas-engines (1885); Papers by D. Clerk

'On the Theory of the Gas-engine' and 'On the Explosion of Homogeneous Gaseous Mixtures,' Min. Proc. Inst.

C.E. (1882 and 1886); Ayrton and Perry, Phil. Mag.
(1884); Brooks and Steward, Van Nostrund's Engineering

Mag. (1883); Slade, Jour. Franklin Inst. (1886); Lecture by F. Jenkin on 'Gas-engines,' Inst. Civ. Eng.
(1884); Roport to the Society of Arts en Trials of Motors
for Electric Lighting (1889).

Gaskell, Mrs, an eminent English novelist, was bern at Cheyne Row, Chelsea, 29th September 1810. Her maiden name was Elizabeth Cleghorn Stevenson, and her father was in succession teacher, preacher, farmer, boarding-house keeper, writer, and Keeper of the Records to the Treasury. She was brought up by an annt at Knutsford—the Cranford which she was yet to describe with such truthful patience—and grew up a girl of singular swectness of disposition and ef great beauty. She was carefully educated, and married in 1832 William Caskell (1805–84), a Unitarian minister in Manchester. Here she studied working men and women from the life, and devoted her days and nights to teaching them and relieving their distress. In 1848 she published anonymously her Mary Barton, which at once arrested public attention. It was followed by The Moorland Cottage (1850), Cranford (1853), Ruth (1853), North and South (1855), Round the Sofa (1869), Right at Last (1860), Sylvia's Lovers (1863), Cousin Phillis (1865), and Vives and Daughters (1865), a series of novels that have permanently enriched English literature, and almost lifted their authoress inte a rank represented alone by Jane Austen, Charlette Brontë, and

George Eliot. Mrs Gaskell had some measure of almost all the gifts of the great novelist-deep and genuine pathos, a singularly genial and truthful humour, a graceful and unforced style, power of description, dramatic faculty on occasion, and sympathetic insight into character; while she wrote at pathing that the did not be she wrote of nothing that she did not know and understand—indeed many passages are close transcripts from her own life-history and experience. Though written with a purpose, her novels have not failed to be completely artistic, perhaps here that they there they have the standard of the sta because they flowed so freely from her heart, and because their purpose was so truly and so much herself. Mrs (askell died suddenly of heart-disease at Holybourne, Alton, in Hampshire, 12th November 1865, and was littingly buried at Knutsford. Besides her novels she wrote The Life of Charlotte Bronto (1857), which will remain one of the masterpieces of English biography. Many Barton was received as a revelation of the labits, thoughts, pringtions and struggles of the industrial nor. as privations, and struggles of the industrial poor, as these are to be found in such a social beehive as Manchester, and has had in its kind many initators, but not an equal.

Gasometer. See Gas.

Gasparin, Valèrie Boissier, Contesse De, was born at Geneva in 1813, and married Count Agénor de Gasparin (1810-71), a zealous advocate Agenor de Gasparm (1810-71), a zeatons advocate of religious liberty. She herself became distinguished among the defenders of the Reformed Communion; withal, she has exposed what she deems the religious and social extravagance of certain sects. Two of her works obtained the Montyon prize at the Académie Française: Le Mariage au point de vue Chrétien, and Il y a des Paurice de Parie et villeurs. Among her des Pauvres à Paris et ailleurs. Among her other publications are Voyage dans le Midi par une ignorante, Allons faire Fortune à Paris, Un Livre pour les Femmes Mariées, Lisez et Jugez (Strictures on the 'Salvation Army'), and Les Horizons Prochaines. Several of her books have been translated into English.

Gaspé, a peninsula in the east of Quebec province, comprising the counties of Gaspé and Bonaventure, projects into the Gulf of St Lawrence, between the estuary of that name on the north and the Bay of Chaleurs on the south. It has an area of nearly 8000 sq. m., and about 35,000 inhabitants, the greater number engaged in the important fisheries, which, with the export of lumber, form the staple luminess of the country.—GASPÉ BASIN, where Cartier landed in 1534 (see CANADA), is a port of entry in Gaspé Bay, now the seat of extensive fisheries. Pop. 726.

Gassendi, or Gassend, Pierre, French philosopher and mathematician, was born 22d January 1592, at Champtercier, a village of Provence. His unusual powers of mind showed themselves at an early or the state of the s selves at an early age. Having resolved upon an ecclesiastical career, he studied, and afterwards taught, philosophy at Aix. But, catching the infection of empirical methods of study, he revolted from the predominant scholastic philosophy, and began to subject it to a critical scrutiny. At the same time he bent his energies upon physics and astronomy. The results of his examination of the Aristotelian system and methods appeared at Grenoble in 1624, Exercitationes paradoxica adversus Aristoteleos, in which he atters an emphatic sits Aristocetes, in which he alters an emphasis protest against accepting the Aristotelian dicta as final in all matters of philosophy, and especially of physics. In the same year he was appointed prenot of the cathedral at Digne, an office which enabled him to pursue without distraction his researches in astronomy and other natural sciences. From 1628 he spent several years travelling through Holland, Flanders, and France, until in 1645 he was

appointed professor of Mathematics in the Collége Royal de France, at Paris, where he died, 14th October 1655. During his stay in the Low October 1655. During his stay in the Low Countries he controverted (1631) the mystical opinions of Robert Fludd, and wrote a treatise on parhelia, besides other astronomical papers. Eleven years later he proceeded also to criticise adversely the new system of philosophy pronulgated by Descartes, in a work entitled Objectiones ad Meditationes Cartesii. Whilst at Paris Gassendi wrote his principal philosophical works, De Vita Epicuri (1647); a commentary on Diogenes Lacr-Epicuri (1041); a commentary on Diogenes Lacrtins' tenth book, De Vita, Moribus, et Placitis Epicuri (1649); and in the same year the Syntagma Philosophiw Epicurew, which contains a complete view of the system of Epicurus. But, whilst thus going back to the ancients in his philosophy, Gassendi marched in the van of the moderns in the standard ordering. in natural and physical science. Kepler and Galileo m natural and physical science. Reper and cames were numbered amongst his friends. His Institutio Astronomica (1647) is a clear and connected representation of the state of the science in his own day; in his Tychonis Brahwi, Nicolai Copernici, Georgii Puerbachii, et Joannis Regiomontani Vitae (Paris, 1654) he gives not only a masterly account of the lives of these men, but likewise a complete history of astronomy down to his own time. His collected works were published by Montmort and Sorbière (6 vols. Lyous, 1658), and by Averrani (6 vols. Flor. 1728).

Gassner, Johann Joseph, exorcist, was born 28th August 1727, near Pludenz, in the Vorarlberg, and became Catholic priest at Klösterle, in the diocese of Coire. He began to cure the sick by driving out the demons that possessed them by means of exorcism and prayer. In 1774 he received the generation of the Richard Ratiology, and by the the sanction of the Bishop of Ratislon; and by the mere word of command, Cesset ('Give over'), he cured the lame or blind, but especially those afflieted with convulsions and epilepsy, who were all supposed to be possessed by the devil. Ultimately he was found to be an impostor; the archbishops of Pragne and Salzhwy issued pastorals against his imposture, and the imperial authorities compelled the Bishop of Ratisbou to dismiss him. But he died, March 1779, in possession of the wealthy deanery of Benndorf.

Gas-tar. See COAL-TAR, GAS, ANILINE, DYE-ING, &c.

Gastein, a romantic valley in the south of the Austrian duchy of Salzburg, 28 miles long, with a number of small villages. The chief of these, Wildbad-Gastein, is a very famous watering-place, and was a favourite resort of the Emperor William I. of Germany. Some 5000 guests visit the place in summer to drink the waters of its seven warm springs. Here, on 14th August 1865, a convention was signed between Austria and Prussia, which, by a partition of Sleswick and Holstein, for a short period prevented the rupture between the rival powers. Pop. of the valley, about 4000. See W. Fraser Rae's Austrian Health Resorts (1888).

Gasteropoda (Gr., 'belly-footed'), a large class of molluses, including snails, slugs, buckies, whelks, cowries, limpets, and the like. Along with the cuttle-fishes or Cephalopods, and the yet more closely allied 'butterfly-snails' or Pteropods, the Gasteropods are contrasted with the bivalves or Lamellibranchs by the more or less prominent development of the head-region, and by the presence of a rasping ribbon or tongue on the floor of the mouth.

General Characters .- In addition to the development of head and rasping tongue, the Gasteropods are characterised by the nature of the 'foot' or muscular ventral surface. Except in some forms adapted for free-swimming, the 'foot' is simple, median, and sole-like. It is the surface on which the animal crawls, and is often divided inte anterior, median, and posterior regions. The wealth of modification included in the class is so great that no other general characters can be given.

General Survey.—(A) The simplest Gasteropods, such as the common Chiton, are symmetrical, not

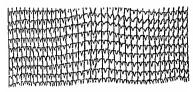


Fig. 1.—Part of the Rasper of the Snail (from Howes).

lop-sided like the higher forms. They have the mouth at one end of the long axis of the body, the They have the anus at the other; the gills, kidneys, genital ducts, and circulatory organs are paired; there are two pairs (pedal and visceral) of nerve cords running parallel to one another along the body, and the ganglia are slightly developed. Of all molluses these simplest Gasteropeds are probably nearest the hypothetical worn-like ancestor. In one order (Chitons, q.v.) there are eight shells, one behind the other like segments; in the two other orders (Neomenic and Chætoderma) the shell is represented only by calcareous plates and spines in the skin. These three orders form the sub-class Isopleura, in contrast to all the others which are unsymmetrical—the Anisopleura.

(B) The latter are grouped first of all according to the state of the loop formed by the visceral nerves. (1) In one series the visceral nerve-loop is implicated and twisted in the torsion of the asym-

body,

metrical and furthermore

the sexes are separate. These are known as Streptoneura ('loop-nerved'), and include

limpets (Patella),

car-shells (Hali-otis), pond-snail (Paludina), cow-

ries (Cypræa), cone-shells

(Conus), buckies

(Buccinum), and

frec-swim-

the

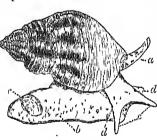


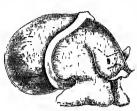
Fig. 2.-A Whelk: Showing respiratory siphon, a; head with tenucles, c, and eyes, d; foot, b, with shell-lid or operculum, s.

ming Heteropods. This division includes what are often called Prosobranchs, and the numerous genera are further arranged according to the characters of the gills, kidneys, and foot (2) In another series the visceral loop is not twisted, and is often very short; the shell is light and often lost in the adult; and the animals are hermaphrodite. They are known as Euthyneura ('straight-nerved'), and include two sets—Opisthobranchs and Pulmonates. Among Opisthobranchs some retain the usual mantle-fold and have a delicate shell—e.g. Bulla and Aplysia, while others (known as Nudibranchs) have their mantle atrophicd and no shell—e.g. Doris and Eolis. Lastly there are the Pulmonates, where gills are replaced by an air-breathing mantle-cavity, as in smalls (e.g. Helix), slugs (e.g. Arion), water-snails

(e.g. Lymnaus),

Mode of Life.—Though the number of terrestrial Gasteropods, breathing the air directly by means of a pulmonary chamber, is very large—over 6000 living species—those living in water are greatly in the majority, including over 10,000 forms, mostly marine. Of these, some 9000 or so belong to the Prosobranchs or Streptoneura, a relatively small minority being Opisthobranchs and Nudibranchs. The Heteropods and some Opisthobranchs enjoy a free-swimming pelagie life, but most marine forms frequent the coasts either on the shores or along the bottom. Deep-sea Gasteropods are compara-tively few. The locomotion effected by the con-tractions of the nunscular 'foot' is in almost all

cases very leisurely, and the average tendency is towards slnggislmess. As to diet, the greatest variety obtains; most Proso-branchs with a respiratory siphon and a corresponding notch in the shell are carnivorous, and so are pods; inost of the Young Pond Snail (Lymnæus) in diet. in diet. Numerous



genera, both marine and terrestrial, are very indiscriminate in their feeding; others are as markedly specialists, keeping almost exclusively to some one vegetable or animal diet. Some marine snails partial to Echinoderms have got over the digestive difficulty presented by the calcareous character of the skins of their victims by a secretion of free sulphurie acid from the mouth. This acid always the carbonacter of the scalar of the interview of the state of the stat acid changes the carbonate of lime into sulphate, which is brittle and readily pulverised by the raspwhich is brittle and readily purversed by the rasping tongue. A few are parasitic—e.g. Enlima, Stylifer, and the very degenerate Entoconcha mirabilis, all occurring in or on Holothurians.

Distribution.—A few Gasteropods occur in strata as far back as the Cambrian, from which remote period they have continued with a steady increase.

Almost all the Palrozoic genera are now extinct, and during these ages the siphon-possessing forms seem to have been almost, if not altogether, nure-presented. A host of new Gasteropods appeared in the Investigation of the angular many of the nucleur in the Jurassic period, and many of the modern families have their origin in Cretaceous times.

Numerous as the fossil forms are, the number of types wholly extinct is comparatively small; both as regards persistence of types and increase of numbers, the Gasteropods are a peculiarly successful class.

Life-history. —The eggs Gasteropods are usually small, and are surrounded with allumen, the surface of which hecomes firm, while in the com-mon small (Helix) and some others there is an egg-shell of lime. The eggs not unfre-quently develop into embryos within the parent, but in most cases they are laid, either singly or in masses, and often within cocoons. Few objects are more Fig. 4.
familiar on the seashore than Section of Triton-shell the chistered egg-cases of the whelk, which together form a ac, notch for siphon; ball often about the size of

(after Owen):

an orange. Inside each of the numerous egg-cases are many embryos, but only a few reach maturity, the others serving as food material, an infantile eannibalism or struggle for existence not uncom-mon in the class. As to the actual development and the larval forms, reference must be made



to the articles on Molluscs and on Empryology; but it may be noted that the ovum divides more or less unequally, according to the amount of yolk, that a gastrula-stage occurs as usual, and that this is succeeded in typical cases, first by a 'Trochosphere' and afterwards by a 'Veliger' larva (see

Molluscs)

General Interest. - As voracious animals, furnished with powerful rasping organs, many Gasteropods play an important part in the struggle for existence among marine organisms, while other terrestrial forms are most destructive devastators of vegetable and flowering plants. The manner in which numerous plants are saved from the ravages of snails, but their chamical and physical characters is an by their chemical and physical characters, is an interesting subject of investigation recently worked out by Professor E. Stahl. From very early times, various Gasteropods, such as whelks, have been utilised for human consumption and also as bait, while yet more frequently the shells, often so beautiful in form and colour, have been used for the decoration of the person and the dwelling, for the basis of cameos, as domestic utensils, or even as weapons, and in many other ways. From the mucous glands of the roof of the gill cavity in From the the genera Purpura and Murex, there exudes the famous secretion, at first colourless, but afterwards becoming purple or violet, which furnished the ancient Tyrian dye.

ancient Tyrian dye.

See Chiton, Limper, Mollusc, Nudibranch, Small, Wheel, and articles dealing with various Gasteropods above mentioned. Also the zoological text-books of Claus, Gegenbaur, Huxley, &c.; Hatchett Jackson's ed. of Rolleston's Forms of Animal Life (Oxford, 1888); Keferstein's 'Mollusca,' in Bronn's Thiorreich (1862-66); E. Ray Lankester, article 'Mollusca,' Ency. Brit. (vol. xvi. 1853); Woodward, Manual of Mollusca (3d ed. 1875).

Gaston de Foix. See Foix. Gastræa, Gastrula. See Embryology. Gastralgia. See Cardialgia. Gastric Fever. See Typhoid Fever. Gastric Juice. See DIGESTION. Gastritis. See STOMACH (DISEASES OF).

Gastrochæ'na, a genus of boring bivalves, not far removed from Teredo and Pholas, but type of a distinct family, Gastrochemidæ, which also includes the remarkable Aspergillum (q.v.) and Clavagella (q.v.). The original shell has the two valves typical of Lauellibranchs; but these are delicate, and become surrounded by a secondary tubular shell lining the cavity which the mollusc bores in limestone, coral, other shells, &c. G.

modiolina, rare British molluse,

Mediterrancan,

half an inch in

an oyster into

the ground

mon in

makes

about inches deep and

diameter. sometimes bores right

below,

com-

holes

throngh

and

the



Gastrochæna Modiolina: a, one of the tubes broken open, showing the valves.

makes for itself, plus little stones and particles of debris, a flaskshaped case, with its neck fixed in the oyster-shell. The tubes of some of the tropical species—e.g. G. clara, from the Indian Ocean, which live in sand are very curious.

Gastro'stomy (Gr. gastēr, 'the helly or stomach;' and stoma, 'mouth'), an operation performed for the relief of stricture of the gullet, to

save the patient from the imminent risk of starvation by introducing food directly into the stomach through an external opening. The well-known case of Alexis St Martin, a Canadian, in whom in conseof Alexis at martin, a Canadian, in whom in consequence of a gunshot would there was a fistulous opening into the interior of his stomach, the success of operations for the removal of foreign bodies from the stomach, and numerous experiments on the lower animals, led to this attempt to save life; and when it is not delayed too long it has proved successful in a fair proportion of cases.

Gastro'tomy (Gr. gaster and tome, 'an incision'), an incision into the cavity of the Abdomen (q.v.) generally for the purpose of removing some diseased texture or foreign body. The term has also been applied to Casarean Operation (q.v.).

Gataker, Thomas, English divine, was born in London in 1574, and educated at St John's College, Cambridge. In succession practice at m London in 1974, and educated at 51 John's College, Cambridge. In succession preacher at Lincoh's Inn, rector of Rotherhithe, and member of the Assembly of Divines at Westminster, he opposed the imposition of the Covenant, and was one of the forty-seven London clergymen who condemned the trial of Charles I. He died in 1654. His works include Of the Nature and Use of Lots (1864), and Charles I. Adversaria Miscollance. (1616); and Cinnus, sive Adversaria Miscellanca (1651).

Gatchina, a town of Russia, 30 miles by rail SSW. of St Petersburg. It has some manufactures of porcelain, and several barracks, but is especially worthy of mention for its royal valuee, surrounded by one of the finest pleasure-gardens in Europe, which was the favourite summer seat of the Emperor Paul I., and the wintor residence—practically, owing to precantions against Nihilists, the prison of Alexander III. Pop. (1880) 10,063.

Gates, Horatio, an American general, was born at Maldon, in Essex, England, in 1728. He entered the English army, served in America, where he was major under Braddock, and with difficulty escaped in the defeat in which that officer was slain. On the peace of 1763 he purchased an estate siall. On the peace of 1705 he purchased an escate in Virginia, where he resided until the war of independence. In this struggle he sided with his adoptive country, and in 1775 was made adjutant-general, with the rank of brigadier, receiving in 1776 command of the army which had just retreated from Canada. In August 1777 he superseded Schuyler in command of the northern department; and, principally as the result of his predecessor; and, principally as the result of his predecessor's able manouvres, he was enabled to defeat and comin October (see Burgoyne). This success gained him a great reputation, which probably is accountable for his endeavour to supplant Washington in the chief command of the army; but this failing, he retired to his estate until 1780, when he was called to the company of the crust of the crust. called to the command of the army of the South, and in the unfortunate defeat near Camden, in South Carolina, lost the laurels he had previously won. He was superseded, and was not acquitted of blame by court-martial until 1782. Ho then retired to Virginia till 1790, when he emancipated all his slaves, and settled in New York. There he died on April 10, 1806.

Gateshead, a town in England, on the northern verge of the county of Durham, and on the south bank of the river Tyne. Governed for containes by a chief bailiff appointed by the prince-bishop of the palatinate, aided by popularly elected burnesses. Gatashead was antisipalitical first, as a burgesses, Gateshead was enfranchised first as a parliamentary borough in 1832, and secondly as a municipal borough in 1835, whilst in 1888 it befrom 15,177 in 1831 to 25,568 in 1851, 65,855 in 1881, and 74,789 in 1889. Thus there is only one urban community along the main line between London and Edinburgh which exceeds Gateshead in population; and the exception is the city of Newcastle-npon-Tyne, which is situated directly opposite (fateshead on the Northumberland or northern bank of the river. The two towns are intimately connected: a splendid suspension bridge (1871) joins them at Redhengh; Stephenson's celebrated High Level (1849) connects them by hoth road and rail; and a swing-bridge (1876), which opens to allow the passage of ships, connects the quayside of Newcastle with the principal thoroughfare of Gateshead. This close association of the two communities is not felt to be of advantage to the Durham borough, because the city on the Northumberland side of the Tyne levies under ancient charter local dnes on all the river trade, which both towns promote, though the emoluments derived therefrom belong exclusively to Newcastle. The older portions of Gateshead have not during recent years been much improved. Many of the old stone buildings have been allowed to fall into considerable decay. Westward and southward extension and improvement are continuous, and the submrbs show many fino villas. The town community is for the greater part industrial. Engineworks, iron-shipyards, electric cable, hempen and wire rope manufactories, chemical works, eementworks, glass-works, and iron-works furnish employment to a large proportion of the inhabitants. The only philanthropic institutions in the town which do not owe their existence to modern public spirit are the grammar-school (1700) and the King James Hospital (1611) for poor brethren.

on voluntary contributions and on grants from local rates. These include successful boys' and girls' rates. These memor steecessim boys and girls high schools, excellent swimming-baths, a useful dispensary, a hospital for the isolated treatment of infectious disease, a literary and scientific institute, a school of art, &c. Public libraries (circulating and reference) were inaugurated in 1886, which are free to all burgesses. Under the management of an energetic school-hoard formed in 1872, two higher-grade and thirty-six elementary schools were opened, in which 20,683 children were in July 1889 receiving instruction. The town-hall and free library are among the architectural ornaments of the borough. A public park at Saltwell, opened in 1874, is also the Besides other places property of the ratepayers. of worship belonging to the various denominations, there are ten churches of the English establishment, including the venerable St Mary's, which in 1080 was the scene of the murder of Bishop Walcher by an English mob. Among places of interest in Catesheal are the site of the fire and explosion of 1854, which cost fifty lives, and destroyed a million pounds' worth of property; the extensive locomotive works of the North-Eastern Railway Company, the finest in the north of Fraland, alleged traces of the project Paper. Eastern Railway Company, the finest in the north of England; alleged traces of the ancient Roman headway or gate's head, from which the name of the town is said to be derived; the andoubted residence in the Hillgate district, during the writing of the immortal Robinson Crusoe, of Daniel Defoe; and the works at which large portions of the first Atlantic cable were manufactured. The quarries from which the world-famous Newcastle grindstones are obtained are also worked within the precincts of Gateshead, at Gateshead Fell. Gateshead continues to be represented, as in 1832, by one member in the House of Commons. For parliamentary and municipal purposes alike, the county borough is divided into ten wards. Its governing hody consists of a mayor, ten aldermen, and thirty conneillors. See Richard Welford's History of Newcastle and Gateshead (2 vols. 1884–85).

Gateway, the passage or opening in which a gate or large door is hung. This may be either an open way with side pillars or a covered way vaulted or roofed over. The gateway, being a most important point in all furtified places, is usually protected by various devices. It is flanked by towers with loopholes, from which assailants may be attacked, and is frequently overhung by a machicolated battlement, from which missiles of every description, may be proposed upon the besievers. every description may be popied upon the besiegers. In the middle ages gateways were also fortified with one portenlis or more, and had frequently an outer work or barbican in front of the gate defended with drawbridges. City gates, and gates of large castles, have in all ages been the subjects of great care in construction; and when from some eanse, such as the cessation of constant fighting, or a change in the mode of warfarc, gateways have lost their importance in a military point of view they have maintained their position as important architectural works, and although no longer fortified have become ornamental. In very ancient times we read of the 'gate' as the most prominent part of a city, where proclamations were made, and where the kings administered justice. The Greek and Roman gates were frequently of great magnificence. The propylera at Athens is a heantiful example, and the triumphal arches of the Romans are the ornamental offspring of heantiful example, and the Romans are the ornamental offspring of their city gates. At Autim in France two Roman gateways, and at Trèves in Germany one, still exist, and formed the models on which early make a content of the models of the content medieval gateways were designed. Most of the English towns have lost their walls and city gates; but a few, such as York and Chester, still retain them, and give us an idea of the buildings which formerly existed, but which now remain ouly in the name of the streets where they once stood. English castles retain more of their ancient gateways, and from these we may imagine the frowning aspect every town presented during the middle ages. Abbeys, colleges, and every class of buildings were slut in and defended by similar of hilldings were shut in and defended by similar harriers; many of these still exist in Oxford and Cambridgo, and the abbey gates of Canterbury and Bury St Edmunds are well-known specimens of monastic gateways. The feeling of personal freedom, which is so strong in England, must no doubt have tended greatly to hasten the demolition of these marks of feudalism; but in many parts of the Continent we still find these barriers Lent in kept up.

Gath, one of the five chief cities of the Philistines, was situated on the frontiers of Judah, and was in consequence a place of much importance in the wars between the Philistines and the Israelites. The famous giant, Goliath, who was slain by the youthful David, was a native. St Jerome describes it in his time as 'a very large village.' Its site is probably the Blanche Guarde of the Crusaders, who built a castle here to command the Philistine plain.

Gatinean, a river of Quebec, in Canada, has its origin in a chain of lakes lying immediately north of 48° N. lat., and, after a SSW. course estimated at 400 miles, enters the Ottawa River, about a mile below Ottawa city.

Cathing, RICHARD JORDAN, born in 1818, in Hertford county, North Carolina, studied medicine but never practised, and is known for inventions as various as machines for sowing cotton and rice and for dressing hemp, a steam-plough, and the famous Gathing gun (1861-62), a revolving lattery gun, usually having ten parallel barrels, and firing in some cases as many as 1200 shots a minute. See MACHINE GUNS.

Gatschina. See GATCHINA.

Gatty, MARGARET. See EWING.

Gau, a German word meaning, in a general way, district, but applied specially to a political division of ancient Germany, having relation to the arrangements for war and the administration of justice. The division into snell districts was in force under the Franks in the 7th century; and at the head of the gan was the graf (see COUNT). As the grafiloms became more and more hereditary, the gan, as a political division, fell into disuse (about the 12th century), and only in the names of some places—Rheingan, Breisgan, Aargan, &c.—do the traces of it remain. See Hundred, Feudalism, Village Community.

Gauchos are the hordsmen of the great plains of the Argentine Republic and Uruguay, where they live in rude lints with scanty furnitaire, and are chiefly employed in driving, catching, and slaughtering cattle. They are mostly of mixed Spanish and Indian descent, sparely built, and of great strength and endurance; they are most expert hoisemen, and use the Lasso (q.v.) and Bolas (q.v.) with marvellous skill. Their dress consists of a rough jacket and trousers, over which a woollen poncho falls, heavy topboots, and a wide-brimmed hat. Cheerful and hospitable, they are violent and vindictive when enraged, and are much given to drink and gambling. Inuced to hardship and fatigue, they have played an important part in the rovolutions of South America.

Gandcamus, the beginning of a famous German students' song in dog-Latin rhymes, of which the first line is Gaudcamus igitur juvenes dum sumus ('Let us therefore rejoice while we are young'). It was first printed, in a somewhat coarser form than the present, and with Latin and German verses alternating, in 1776; and follows rather closely the thought and expression of an ancient Latin hymn of the year 1267. See Schwetschke, Zur Geschichte des Gaudcamus (Halle, 1877).

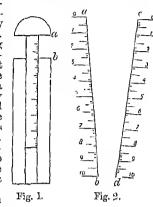
Gauden, John. See Eikon Basilike.

Gauge, or Gage, an apparatus for measuring any special force or dimension; thus we have pressure-gauge, wind-gauge (see Anemometer), Rain-gauge (4.v.), wire-gauge, button-gauge, &c. The simplest form of gauge of dimension is the common wire-gauge, by which the diameter of wire is measured. It is simply an oblong plate of steel, with notches of different widths cut upon the edge; these are numbered, and the size of the wire is determined by trying it in the different notches until the one is found which it exactly fits. The thickness of sheet-metal is tried by the same gauges. There is a great want of uniformity in these gauges—the Birmingham gauge for iron-wire, sheet-iron, and steel differing from that used for brass, silver, gold, &c.; and these again from the Lancashire gauges. It has been proposed, in order to obtain uniformity, and to enable definite descriptions and orders to be given with accuracy and certainty, that, instead of the arbitrary numbers of varying signification now in use, decimal parts of an inch, tenths, hundredths, thousandths, or still smaller fractions, if necessary, be used, and that these be used for all diameters and thicknesses, such as wires, sheetmetals, buttons, watch-glasses, &c.; but such a scale has not yet come into general use. The Birmingham wire-gauge has, however, been widely adopted. The gauge commonly used for buttons and such like larger diameters is a rule with a groove cut lengthwise down the middle. Another metal rule, with a brass lead, slides in this, and by means of a thumb-pin may be pushed out at pleasure. The object to be measured is placed between a and b (fig. 1), and the width of this

space is measured by graduations on the middle metal slide.

A very elegant and delicate gange is used for

measnring watchglasses, and is applicable to many
other purposes.
On an oblong
piece of sheetmetal two straight
metal ridges are
fixed in such a
manner that they
shall be inclined
at a given angle
to each other, as
ab and cd (fig. 2).
Now, let us suppose the angle to
be such that the
distance between a
and c is 2 inches,
and that between
b and d is 1 inch,



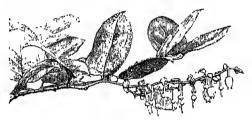
while the lengths ab and cd are 10 inches. It is evident that for every inch of descent from a and c towards b and d there will be a narrowing equal to \(\frac{1}{2}\) to f an inch; and for every tenth of an inch of such descent there will be a narrowing of \(\frac{1}{2}\) of the of an inch; and so on: thus we may, by graduating downwards from ac to bd, measure tenths by units, hundredths by tenths, and so on to still finer quantities if required. This is applicable to lengths as well as diameters. By means of fine serows with large graduated heads, Messrs Whitworth have measured small pieces of steel to the one-millionth of an inch (see Micro-Metter). Pressure-gauges, wind-gauges, &c. will be treated under the special subjects.—In railways, the gauge means the distance between the rails (see Railway).—The term Gauling refers specially to the gauging of the contents of casks; and in many places the popular name for the excise officer who measures the contents of casks containing excisable liquors is 'gauger.'

Gaul. Sec France.

Gault (a local name in Cambridgeshire for clay) is one of the subdivisions of the Cretneeous System (q.v.). The gault is a stiff, bluish-gray clay, which here and there contains indurated undules and septaria. Now and again it becomes somewhat calcareous, or sandy and micaccous. In some parts of Sussex a band of phosphatic nodules occurs at its base. The deposit is of variable thickness—reaching in some places over 300 feet, while occasionally it hardly attains a greater thickness than 50 feet, and forms a well-marked geological horizon—forming the bottom member of the Upper Cretaceous rocks. It is abundantly fossiliferous, the remains heing almost exclusively marine, only a few drifted land-plants having been met with. One of the best exposures of the gault in England is at Folkestone. In the Isle of Wight this formation is known as the 'blue slipper,' from the readiness of the overlying beds to slip or slide over its surface. The picturesque 'Underchiff' owes its origin to these landslides. The gault is extensively employed in the manufacture of bricks and tiles; it forms a retentive and rather unproductive soil.

Gaultheria, a genus of small procumbent evergreen shrubs, of the order Ericaceæ, named by the Swedish botanist Kalm in honour of Dr Gaultier of Quebec. G. procumbens is a common plant in North America as far south as Virginia, and bears the names of Chockerberry, Partridge Berry, Deer Berry, Wintergreen, and Mountain Tea. It is about 4 or 5 inches in height, with

small whitish flowers and red 'berries,' which are eatable, but not safe in any considerable quantity, because of the pungent volatile oil which they contain. Brandy in which they have been steeped is used as a tonic. The whole plant has an agreeable aromatic odour and taste, and the volatile oil is used in medicine as a stimulant, also volatile off is used in inequatine as a seminant, also for flavouring syrups, and in perfumery, under the name of Oil of Wintergreen. An infusion of the berries (hence called 'tea-berries') was used as tea during the war of independence. The berries are during the war of independence. The berries are employed for flavouring beer and other drinks, as also for tooth-powders and hair-washes. The leaf is astringent, and is used in medicine.—The Shallon



Shallon (Gaultheria shallon).

(G. shallon) is a large species (2-3 feet), with purple herries ('salal-berries'), which are largely eaten by the Indians of north-west America. It grows well in woods, and is sometimes planted in Britain to afford food for game.—G. hispida (Wax-cluster) is a native of Van Diemen's Land, bearing snow-white berries.—Other species, some fragrant, some producing edible berries, and all beautiful little shrubs, are found in mountain regions throughout the world. The Australian G. antipoda is said to be a finer fruit than G. hispida. hispida.

Gaunt. See GHENT; and for John of Gaunt, see John of Gaunt.

Gauntlet, less correctly GANTLET (formed with double diminutives from Old Fr. gant, 'a glove,' itself a word of Scandinavian origin), an

with dothole diffinitives right of the armour of glove, which formed part of the armour of knights and men-at-arms. The back of the hand was covered with plates jointed together, so as to permit the hand to close. Gauntlets were introduced about the 13th century. They were often thrown down by way of challenge, like gloves. They are of frequent occurrence in heraldry.

In the phrase 'to run the gantlet,' the word is due to a confusion with the foregoing of the original word gantlope or gatlope, the Swedish gatlopp, made up of gata, 'a street,' and lopp, 'a course,' from lopu, 'to run'—a cognate of Engleap. Professor Skeat suggests that the word may be due to the wars of Gustavus Adolphus, who died at Lützen in 1632. The German form is gassenlanfen, 'lane-run,' both alike meaning a military punishment, which consists in making the enlprit, maked to the waist, pass repeatedly through a lane formed of two rows of soldiers, each of whom gives him a stroke as he passes with a of whom gives him a stroke as he passes with a short stick or other similar weapon.

Gair, the medieval capital of Bengal, also called Lakhnanti, is said to have been founded by the Vaidya king Lakshmanasena, at the close of the 11th century, and, on the Mohammedan conquest, a hundred years later, became the chief seat of the viceroys who governed Bengal undor the Pathan kings of Delhi, and atterwards (but not always) of the independent kings of Bengal. On the Mogni conquest in 1575 a terrible pestilence broke out at Gaur and thousands of the inhabit. broke out at Gaur, and thousands of the inhabit-

ants perished; and from that time the city disappears from history, and its place is taken successively by Tandan, Dacca, and Murshidabad. The ruins of Gaur still cover a space of seven miles by two, on a branch of the Ganges, and include Hindu huildings as well as several interesting lothecutary Mohanmedan mosques, besides extensive reservoirs, channels, and embanked roads. The vast accumulations of brick testify to the former density of the population, while the neighbouring rnins of Panduah and Tandan point to the existence of important suburbs, many of which have wholly disappeared. See Ravenshaw, Gaur, its Ruins and Inscriptions (1878); Forgusson, History of Indian Architecture; Lame-Poole, Catalogue of Indian Coins in the British Museum.

Gaur, or Gour (Bos Gaurus), a species of ox, inhabiting some of the mountain jungles of India. It is of very large size, although apparently inferior to the Arnee (q.v.). It bears a considerable resemblance to the Gayal (q.v.), but differs from it in the form of its head, and in the total want of a dewlap, in which it more nearly agrees with the Bauteng of the Eastern Archipelago, although distringuished from it by important anatomical peculiarities (see Banteng). It is supposed to be incapable of domestication; frequent attempts for this purpose are said to have been made in Nepal. From its feroeity its pursuit is reckoned in India as exciting as that of tiger or elephant.

Gauss, Johann Karl Friedrich, German mathematician, born at Bunswick, 30th April 1777, in 1801 published an important work on the theory of numbers and other analytical subjects, Disquisitiones Arithmetice. Shortly afterwards his attention was attracted to astronomy; and he invented, and used in brilliant fashion, new methods for the calculation of the orbits of planets, comets, &c. The fruits of his researches in this department appeared, two researches in this department appeared, two years after his appointment as professor of Mathematics and director of the observatory at Gittingen, in his Theoria Motus Corporum Calestium (1809). He also laboured with equally brilliant success in the science of geodesy, being appointed by the Hanoverian government to conduct the trigonometrical survey of the kingdom and to measure an arc of the meridian. Whilst opposed in this work he invented the instrument. and to measure an arc of the meritian. Whilst ongaged in this work he invented the instrument then called heliotrope (see Heliografily). Later in life (in 1843-46) he published a collection of valuable memoirs on surface geometry, in Ueber Gegenstiande der höhern Geodüsie. In the meantime he had also begun to study the problems arising out of the earth's magnetic properties. In 1833 he wrote his first work on the theory of magnetism, Intensitas Vis Magneticæ Terrestris; and in conjunction with W. E. Weber he invonted the declination needle and a magnetometer. He was also mainly instrumental in founding a Magnetic Association, which published valuable papers, entitled Resultate (1836-39), including two by Gauss on the law of magnetic attraction. In applied mathematics he investigated the problems connected with the passage of light through a system of lenses, in Dioptrische Untersuchungen (1840). Besides the researches already mentioned he wrote papers or works on probability, the method of least squares, the theory of biquadratic residues, constructed tables for the conversion of fractions into decimals and of the number of classes of binary quadratic forms, and discussed by the researches arise, intermediation curved surfacements. ongaged in this work he invented the instrument classes of binary quadratic forms, and discussed hypergeometric series, interpolation, curved surfaces, and the projection of surfaces ou maps, all of which, with others, are printed in the seven vols. of his collected works (Gött. 1863-71). Gauss died at Göttingen, 23d February 1855. See Lives

by Sartorius von Waltershausen (2d ed. 1877) and Winnecke (1877).

Gaussen, Francois S. R. Louis, a Swiss Reformed theologian, born at Geneva, 25th August 1790, was pastor at Satigny near Geneva, and took an active part in the church controversies of the time, until dismissed in 1831 by the State Council of Geneva, because he, with Merle d'Aubigné, had taken part in establishing the Société Evangélique, one object of which was the founding of a new theological school for the maintenance of the old Calvinism. From 1836 till his retirement in 1857 he lectured with success in the new college, and died at Les Grottes, Geneva, 18th June 1863. Of his writings may be named La Theopneustic, on Pleine Inspiration des Saintes Écritures (1840), a defence of plenary inspiration, which became popular in England and America; and Le Canon des Saintes Ecritures au double point de vue de la Science et de la Foi (1860).

Gantama. See Buddhism.

Gautier, Theophile, one of the most accomplished of recent French poets and prose-writers, was born at Tarbes, August 31, 1811, and educated at the grammar-school of his native town, and afterwards at the Collège Charlemague in Paris. He applied himself at first, but without much success, to painting, turned to literature, and attracted the notice of Sainte-Benve at eighteen by the style of several essays, the results of his studies in the carlier French literature. He soon attached himself to the school of Victor Hugo, and outdid all the other romanticists in the extravagance of his admiration and partisanship. His belief in the 'poet of the wind, the sea, and the sky' was the one serious belief of his life. In 1830 he published his first long poem, Albertus, an extravagantly picturesque legend, full of the promise of his later flexibility of diction, followed in 1832 by the striking Comédie de la Mort. But his poetry did not reach its highest point till the Emana et Camées (1856). In 1835 appeared his celebrated novel, Mademoiselle de Manpin, with its defiant preface, which was taken seriously by the critics, instead of being regarded as merely the escapade of an unscriptionally elever as merely the escapade of an unscriptionally elever youth, and the advertisement of a publisher who wanted a 'sensational' novel. Ho wrote many other novels and shorter stories, the chief being Les Jenne-France (1833), Fortunio (1838), Unc. Larme du Diable (1839), Militona (1847), La Peau de Tigre (1852), Jettatura (1857), Le Capitaine Fracesse (1863), La Belle Jenny (1863), and Spirite (1866). Mérimée alone contests with him the palm drawn early to the lucrative task of fuillton writing, and for more than thirty years contributed to the Paris newspapers criticisms on the theatre and on the salon. The first hulf of his theatrical criticisms were collected in 1859 in 6 volumes, under the ambitions title of L'Histoire de l'Art Dramatique en France; his accounts of the Salon, which have yet to be republished, form perhaps the best history, if the least didactic, of modern French att. His leisure he devoted to travels in Spain, Holland, Turkey, England, Algeria, and Russia, of which he published characteristic accounts in his Caprices et Zigzage, Constantinople, Voyage en Russie, and Voyage en Espague, admirable feats of description, relating solely to the look of the countries Visited, not at all to their institutions, yet forming neulang the most delicities lacations, yet forming perhaps the most delightful books of travel in existence. Gautier died in Paris, October 23, Other works were an enlarged edition of his ininitable Emaux et Camées (1872); Les Grotesques (1844), on the writers of the 16th and 17th centuries; Honoré de Balzac (1858); Ménagerie Intime (1869); a kind of informal autobiography; Histoire

du Romantisme (1872); and the posthumous works, Portraits et Souvenirs Littéraires (1875), and L'Orient (1877). Gantier's name has become a kind of watchword and battle-cry. Writers with more enthusiasm than good sense have made him an idol, and elevated the paradoxes of his scepticism into a theory of life, while the study moralists of the pressuse his name as a synonym for everything in art that is effeminate, and for all the affectations of the bondoir poetaster. The truth is that Gantier was nothing greater or less than a consummate artist in prose and verse. He is neither moral nor immoral; has absolutely no fixed faith of any sort, except in the pleasantness of pleasant impressions, holding even his aesthetic principles with good humonred laxity. His whole philosophy is a philosophy of paradox, his ideal of life bardly more than a picture-sque viciousness. His besetting sin was a childish desire to say something clever and wicked to shock the Philistines. He himself never expected his lewd romance to be taken seriously, to be adopted as the gospel of a school, and characterised with grave absurdity as 'the golden book of spirit and sense.' See the collections of reminiscences by Ernest Feydeau (1874) and Bergernt (1878); also Henry James's French Poets and Novelists (1878).

Ganze, a light transparent silk fabric, supposed to have derived its name from having first been manufactured in Gaza, a city of Palestine. Prance and Switzerland produce large quantities. The openness of texture is obtained by crossing the warp threads between each thread of the weft, so that the weft passes through a succession of loops in the warp, and the threads are thus kept apart, without the liability to sliding from their places, which would take place if simple weaving were left so loose and open. It is used for dress purposes, and largely also for sifting flour. What is made for the latter purpose is semetimes called botting-cluth. The cotton fabric lone has the same structure as ganze. Cheap textiles of the nature of ganze are used for the dresses of ballet-girls. For wire-ganze, see Wire Glotth.

Gavarni, Paul, a French caricaturist whose proper name was Sulpice Guillaume Chevalier, was born at Paris in 1801, and started life as a mechanical engineer. But, being a skilful draughtsman, he abandoned engine-making to become a caricaturist for Les Gens du Monde, and afterwards for Le Charivari. During the early part of his career he ridiculed the follies, vices, and habits of the citizens of Paris with a sort of good-mouved irony; but later in life a deeper enriestness, and sometimes even bitterness, showed itself in the productions of his pencil. This tendency was greatly strengthened by a visit to London in 1849, and from that date he reproduced in the newspaper Pillustration the scenes of misery and degradation be had witnessed in the English capital. Gavarni also illustrated several books, the most notable being Sue's Julf Errant, Balzac's works, the French translation of Hoffmann's tales, &c. He died at Auteuil, near Paris, 23d November 1866. A collection of his drawings, engraved on wood, appeared at Paris, under the title of Œuvres Choisies, with text by Janin, Gamtier, Balzac, and others (4 vols. 1845-48). This was followed by a second collection, Perles et Parares (2 vols. 1850).

Gavazzi, Alessandro, a popular Italian preacher and reformer, was born at Bologna in 1809. He became a monk of the Barnahito order, and was appointed professor of Rhetoric at Naples, where he speedily acquired great reputation as an orator. On the accession of Pius IX, to the papal chair, Gavazzi was one of the foremost supporters of the liberal policy that imagurated that pontill's

reign; and having repaired to Rome, he devoted himself to the diffusion of political enlightenment and patriotic aspirations among the masses of the Roman population. The pope sanctioned his political labours, and appointed him almoner of a body of 16,000 Roman troops. On the establishment of the republic at Rome, he was appointed almoner-in-chief to the national army. Under his superintendence, efficient unilitary hospitals were organised. Rome having fallen, Gavazzi escaped to England, where he delivered addresses and lectures. He separated from the Catholic Church, and was for the rest of his life a strennously anti-papal advocate. From Scotland the Italian orator proceeded to the United States, where he was rather coldly received; and when he went to Canada his public appearances, on more than one occasion, nearly caused a riot. Gavazzi was present with Garibaldi at Palermo during the expedition of 1860. He again visited London in 1870; and after that repeatedly visited England and Scotland, preaching and lecturing in aid of the (Protestant) Italian Free Church (Libera Chiesa), of which he was a prominent leader. He died 9th January 1889.

Gavelkind. The origin of this legal term is involved in some obscurity, and more than one derivation has been given. Lord Coke's opinion was that it was derived from gave all kinde (Tent. gif cal cyn), meaning the eustom which gives right of succession in land to all children equally. The better opinion, however, seems to be that it is derived from the Saxon word gavel (or gafol), which signifies rent or customary services in lien thereof, and kind—i.e. nature or quality. Thus gavelkind was used to express land which paid this kind of rent-service, as distinguished from the ordinary fendal tenure of knight-service. It is the ordinary fendal tenure of knight-service. It is the oninion of Blackstone, endorsed by Skeat, that the true origin of this custom is Celtic (Irish, gabhaileine), while some recent investigators—as Elton in his Origins of English History (1881)—think that we must look for its source even farther back in the Arvan times.

think that we must look for its source even farther back in pre-Aryan times.

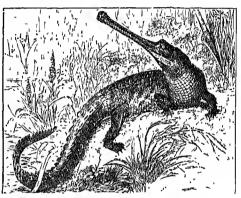
Bofore 1066 gavelkind prevailed all over England and Wales (see Stephen's Com. i. 213), but with the Norman Conquest came feudal laws, and the right of primogeniture took its place. At the present day it survives only in the country of Kent and a few isolated places in England. It was specially abolished as regards Wales by 34 and 35 Henry VIII. chap. 26. In Kent, however, the enstom is so universal that it is presumed by the courts of law to exist in any question affecting Kentish lands, and it is necessary in such case to plead that the lands have been disgavelled by special act of parliament. The reason why the country of Kent should have been permitted to retain this ancient tenure as one of its 'liberties,' in view of the almost universal introduction of feudal rules into the rest of England, is not clear. There is an explanation of a legendary character that William the Conqueror owed his life to some Kentish men, who immediately after the battle of Hastings surrounded him with boughs so as to form a sort of moving wood, and that he out of gratitude thereupon confirmed their ancient rights to them and their fellows.

The main characteristic of the tenure of gavel-kind is that succession to the land passes in the right line to all the sons equally and not to the eldest son. Failing sons, it goes to all the eldest son. Failing sons, it goes to all the daughters as heirs-portioners. Further, the right of representation takes place, so that, if one of several sons should die, his issue (daughters in this event equally with sons) take in his place. Succession in the collateral line is similar; for, if one brother die, the succession passes to all his

brothers equally and their issue jure representation is. In addition to these peculiarities in the matter of succession, the following features of gavelkind tenure may be noticed: (1) A wife takes by way of dower one-half instead of one-third of the land, and a limsband becomes tenant by courtesy of one-half of the land (whether issue have been born or not) so long as he remains unmarried; (2) the tenant is of age sufficient to make a contract or alienate his estate by feoffment at the age of liftcen; (3) the gavelkind lands did not formerly escheat in ease of an attainder for felony, the maxim being 'the father to the bough, the son to the plough;' but all lands now stand in the same position in this respect (Williams, On Real Property, 130).

Gaveston, Piers DE. See EDWARD II.

Gavial (Gavialis), a genns of reptiles of the Crocodile (q.v.) order, conspicuously differing from true erocodiles and from alligators in the great length and slenderness of the snout. The teeth are very numerous, about 120; they are more equal in size than those of the other animals of this order.



Gavial (Gavialis gangeticus).

The best-known species, G. gangeticus, inhabits the Ganges. It attains a length of 24 feet; but, owing to the slenderness of its snort, it is esteemed less dangerous than a true crocodile of smaller size. The gavial feeds chiefly on fishes and carcasses, and preys more casually upon mammals. A cartilaginous swelling at the extremity of the muzzle seems to have given rise to Elian's statement that the crocodile of the Ganges had a horn at the tip of its snort. In some parts—e.g. Malabar, the gavial is held sacred, worshipped, and petted. A smaller species from Borneo and Java is distinguished as G. schlegelii. See Croco-Dile.

Gavotte, a French dance of a lively yet dignified character. The name is said to be derived from the Gavots, the people of the pays de Gap. The music is in common time, moderately quick, and always begins on the third beat of the bar; each of the two sections of which it consists is usually repeated. It is frequently introduced in the Suites (q.v.) of the elder classical composers (Bach, &c.); and recent imitations of this and other old dances are so numerous as to become wearisome.

Gay, John, the youngest son of William Gay of Barnstaple, was born in 1685. Although of an old family, his father was in reduced circumstances; and Gay, after being educated at the local grammarschool, was apprenticed to a London silk-mereer. Disliking this occupation, he soon abandoned it, and, having spent some months at home, returned to London to live by letters. In 1708 he published his first poem, Wine, in blank verse, and in 1711

an anonymous pamphlet, called the Present State of Wet. By this time he had made the acquaint-ance of Pope, to whom in 1713 he dedicated a georgic, Rural Sports. Late in the previous year he had been appointed secretary to the Duchess of Monmouth. In 1714 he brought out The Fan, and following this, The Shephord's Week, a contribution to Pope's crusade against Ambrose Philips. Subsequently, resigning his post with the Duchess of Manyanth has managing the Duchess of Monmouth, he accompanied Lord Clarendon, then envoy to Hanover, as secretary. At Anne's death he was again in London, endeavouring to conciliate fortune by an epistle to the newly-arrived Princess of Wales. His next effort was the arrived Princess of Wales. His next effort was the What d'ye Call It? 'a tragi-comi-pastoral farce' (1715). Trivia, a clever picture of town life from a pedestrian's point of view, for which Swift supplied hints, came next; and later he bore the blame of Three Hours after Marriage (1717), a play in which Pope and Arbuthnot had the larger part. In 1720 he published his poems by subscription, clearing £1000. With this his friends hoped he would have made some provision for the future but it apual ently vanished, as did also some force in would have made some provision for the future, but it apparently vanished, as did also some South Sea stock which had been presented to him, in the crash of 1720. In 1724 he produced The Captives, a tragedy, and three years afterwards the Cuptives, a tragedy, and three years afterwards the first series of his popular Fables. But his greatest success was The Begyar's Opera, the outcome of a suggestion for a 'Newgate pastoral' made by Swift as far back as 1716. Its popularity was extraordinary; it ran sixty-two nights, gave celebrity to its actors, and, in the popular phrase, made Rich (the manager) gay, and Gay (the author) rich. By the thirty-sixth night he had netted between £700 and £800; and he forthwith set about a sequel, Polly, which was prohibited. This step only served to give the play a greater sale in book form, and the subscriptions brought Gay £1200. After this he lived chiefly with the Duke and Duchess of Queensberry, who since 1720 had been the kindest of his many patrons. In back and Duchess of Queensborry, who since 1720 had been the kindest of his many patrons. In 1732 he came from their house to London, probably in connection with his opera of Achilles (produced in 1733), was seized with an inflammatory fever, and died in three days (4th December 1732). He was buried in Westminster Abbey 'as if he had been a peer of the realm.'

As a man Gay was amiable, indolent, and luxurious. His health was bad, and he wasted his life in vain hopes of preferment. But no man If the in vain hopes of preference. But no man made kinder friends; and that he retained them is proof of his personal charm. His Fables have still a faint vitality; folklorists and antiquaries still study Trivia and The Shepherd's Week, and 18th-century specialists delight in the chronicle of his two ballad operas. On the whole, however, his rectical reputation has not been maintained. But poetical reputation has not been maintained. he was a charming song writer, and will perhaps last longest by his ballad of 'Black-eyed Snsan.' The best portrait of him is by Kneller's pupil, William Aikman.

Gaya, the chief town of Gaya district, in Bengal, on the Phalgu, 57 miles S. of Patna by rail. It is a place of the greatest sanctity, from its associations with the founder of Buddhism (q.v.), and is annually visited by about 100,000 Hindu pilgrims, who, under the guidance of the Brahman pligrams, who, under the guidance of the Brahman priests, pray for the souls of their ancestors at the forty-five sacred shrines within and without the walls. Gaya proper is the old town, where the Brahmans reside; adjoining, but distinct from it, is Sahibganj, the trading and European quarter, and seat of administration. Joint pop. (1881) 76,415.—The district has an area of 4712 sq. m., and a pop. (1881) of 2,124,682.

Gaya, the wine suburb of Oporto (q.v.).

Gayal (Bibos frontulis), a species of ox, which is found wild in the mountains of Aracan, Chittagong, Tipura, and Sylhet, and which has long been domesticated in these countries and in the eastern parts of Bengal. It is about the size of the Indian buffalo, is dark brown, and has short curved horns.

Gay-Lussac, Louis Joseph, chemist and physicist, was born 6th December 1778, at St Léonard (Hante Vienne). Entering the Polytechnic School in 1797, he was in 1800 promoted to the department of Ponts et Chaussees; and shortly afterwards Berthollet selected him as his assistant in the government chemical works at Arcueil. He now began a series of original researches on the dilatation of gases, the tension of vaponus, the improvement of thermometers and barometers, the density of vapours, hygrometry, evaporation, and capillary action. Next, first with Biot, and a month later alone, he made two balloon ascents for the purpose of investigating the temperature and moisture of the air and the laws of terrestrial magnetism. Along with Alexander von Humboldt he nctism. Along with Alexander von Jinnipodut ne analysed the properties of air brought down from a height of nearly 23,000 feet, and their joint memoir to the Academy of Sciences (read lst October 1804) contained the first announcement of the fact that oxygen and hydrogen unite to form water in the proportion of one volume of the former to two volumes of the latter (see ATOMIC THEORY). This result induced him to study the combining volumes of other gases, and thus led him to the important discovery of the law of volumes, which was announced in 1808. A year later he was appointed professor of Chemistry at the Polytechnic appointed professor of Chemistry at the Polytechnic School, and from 1832 also filled the corresponding chair in the Jardin des Plantos. Davy's discovertes of potassium and sodium, by the decomposing action of the voltaic pile, stimulated Gay-Lussac and Thénard to pursue this class of researches. The results appeared in their Recharches Physicochiniques (2 vols. 1811). Amongst the most important of the discoveries amounced in these volumes were a unroly chemical privoes for obtain. volumes were a puroly chemical process for obtaining potassium directly, the separation of boron from boracie acid, and new and improved methods from boracie acid, and new and improved methods of analysing organic compounds. (Boron was, however, simultaneously discovered in England by Davy.) Although the discovery of iodine (in 1811) is due to Courtois, Gay-Lussac shares with Davy the merit of having (in 1818) first described its distinctive properties, and proved that it is an elementary body; he was also the first to form synthetically the compounds of iodine with hydrogen and oxygen, known as hydriodic and iodic acids. In 1815 he succeeded in isolating the compound radicle Cyanogon (q.v.), the first known example of a compound body which will unite with elementary bodies in the same way as these unite with one another. Later in life he experimented upon fermentation, and in conjunction with Licbig made an examination of fulminic tion with Liebig made an examination of fulminic acid, and further improved the mothods of organic analysis. From this time a good deal of his attenthat yes. From this time a good dear of his account on was given to the practical applications of chemistry. In this department his investigations regarding the manufacture of sulphuric acid (which led to the introduction of the Gay-Lussac tower, first erocted by him for the recovery of waste oxides of nitrogen), his essays on the blenching chlorides, his method of using the centesimal alcoholomoter, his method of using the centesimal alcoholomoter, and his improvements in assaying silver by the wet method by means of a standard solution of common salt, are the most important. In 1805 he was appointed a member of the Committee of Arts and Manufactures, established by the minister of Commerce, in 1818 superintendent of the governments and the superintendent of the governments. ment manufactory of gunpowder and saltpetre, and

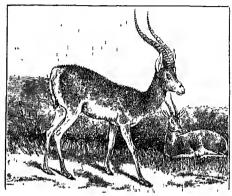
in 1829 chief assayer to the mint. In 1839 he was made a peer of France. From the year 1816 he was the editor, in association with Arago, of the Annales de Chimie et de Physique. He died at Paris, 9th May 1850. As a chemist Gay-Lussac is distinguished by great accuracy, descriptive clearness, and undoubted genins. A complete list of his papers is given in the Royal Society's catalogue. His larger works, besides that already mentioned, include Mémoires sur l'Analyse de l'Air Atmosphérique (1804), Cours de Physique (1827), and Leçons de Chimie (1828).

Gaza (now called Guzzeh), one of the five chief cities of the ancient Philistines, situated in the south-west of Palestine, about three miles from the sea, on the bordens of the desert which separates Palestine from Egypt. It is often mentioned in the history of Samson, and was the scene of constant struggles between the Israelites and the Philistines. In 333 n.c. it was taken after a five months' siege by Alexander the Great, and from that time down to 1799, when the French under Kleber captured it, it witnessed the victories of the Maccahees, the Calif Abu-bekr, the Templars, and the heroic Saladin. Constantine the Great, who rebuilt the town, made it the seat of a bishop. The modern Guzzeh is a collection of mere villages. It has no gates, no fortifications or defences of any kind. The only building of interest is the great mosque, with its tall octagonal minarot and peaked roof. Pop. 16,000.

Gaza, Theodorus, one of the earliest to revive Greek learning in the West, was born at Thessalonica in 1398, ited about 1444 before the Turks to Italy, where he became teacher of Greek at Ferrara, next of philosophy at Rome. After the death of Popo Nicholas V., King Alfonso invited him to Naples; but the death of this new patron two years later drove him back to Rome, where he was befriended by Cardinal Bessarion, who obtained for him a small benefice in Calabria. There he died in 1478. Gaza has been warmly praised by subsequent scholars, such as Politian, Erasmus, Scaliger, and Melanehthon. His principal work was a Greek grammar in four books, first published by Aldus Maurtins at Venico in 1495. He translated into Latin portions of Aristotle, Theophrastus, St Chrysoston, Hippocrates, and other Greek writers.

Gazelle is a name given to some twenty different species of antelopes, which differ from each other principally in the form of curvature of the horns, in the presence or absence of horns in the female, and in the colour. The true gazelle (Gazella Dorcas) is a species about the size of a roeback, but of lighter and more graceful form, with longer and more slender limbs, in these respects exhibiting the typical characters of the antelopes in their highest perfection. It is of a light tawny colour, the nuder parts white; a broad brown band along each flank; the hair short and smooth. The face is reddish fawn-colour, with white and dark stripes. The horns of the old males are 9 or 10 inches long, bending outward and then inward, like the sides of a lyre, also backward at the base and forward at the tips, tapering to a point, surrounded by thirteen or fourteen permanent rings, the rings near the base being closest together and most perfect. The horns of the female are smaller and obscurely ringed. The ears are long, narrow, and pointed; the eyes very large, soft, and black; thore is a tuft of hair on each knee; the tail is short, with black hairs on its upper surface only, and at its tip. The gazelle is a native of the north of Africa, and of Syria, Arabia, and Persia. Great herds of gazelles frequent the northern borders of the Sahara; and notwithstanding their great speed, and the resist-

anee which they are capable of making when eompelled to stand at bay—the herd closing together with the females and young in the centre, and the males presenting their horns all around—lions and panthers destroy them in great numbers. The speed of the gazelle is such that it cannot be successfully hunted by any kind of dog, but in some parts of the East it is taken with the assistance of faleons of a small species, which fasten on its head, and by the flapping of their wings blind and confuse it, so that it soon falls a prey to the hunter.



Gazella Granti.

It is also captured in enclosures made near its drinking-places. Although naturally very wild and timid, it is easily domesticated, and, when taken young, becomes extremely familiar. Tame gazelles are very common in the Asiatic countries of which the species is a native; and the poetry of those countries abounds in allusions both to the beauty and the gentleness of the gazelle.—Some confusion has arisen among naturalists as to the application of the name gazelle, originally Arabic; and it has not only been given to the leucoryx of the ancients, a very different species, but even to the gemeloc of South Africa. The true gazelle was known to the ancients, and is accurately described by Elian under the name dorcas, which was also given to the roe.

Gazette, an abstract of news, a newspaper. The word is derived, through the medium of French, from Italian gazzettu, 'a gazotte,' which may have been originally a mero diminutive of gazzu, 'magpie,' with the sense of 'gossip, tittle-tattle;' or, with greater likelihood, gazzetta, 'a small coin' (Gr. gaza, 'a treasury,' a word ultimately of Persian origin), the sum charged for a reading of the first Venetian newspaper, which appeared about 1536. The London Gazette is an official organ, the property of the government. It was founded in 1665, and appears twice a week. It is recognised by law as the medium of official and legal announcements, as also of many intimations with regard to private transactions which are required by law to be thus published, such as trust-deeds for creditors. Similar official gazettes are published at Edinburgh and Dublin. To be 'put in the gazette' is in Britain a popular synonym for becoming bankrupt.

Gazetteer is in modern English a geographical or topographical dictionary, or alphabetical arrangement of place-names, with a more or less abundant complement of information, descriptive, statistical, and historical. The word (like the corresponding French gazetier) was familiar in the 18th century in the sense of a writer in the gazettes or newspapers. That industrious compiler, Laurence Echard or Eachard, published in 1703 The Gazet-

teer's or Newsman's Interpreter, being a geographical index of all the considerable Utities, Patriarchships ... Ports, Forts, Castles, &c. in Europe. 'The Title, he says, 'was given me by a very eminent person whom I forbear to name.' In the preface person whom 1 forbear to name.' In the preface to the second part (1704), relating to Asia, Africa, and America, he refers to his book briefly as The Gazetteer. Other compilers soon adopted the convenient abbreviation. The word was new, but the thing was of ancient date—e.g. we still have considerable fraquents of the 6th continuous conscience. siderable fragments of the 6th-century geographical dictionary of Stephanus Byzantius,

General Gazetteers. -The ideally perfect gazetteer would be one in which every place-name in the world was registered and its history recorded. To any one who knows what this would mean, the most extensive 'Universal' gazetteer must appear amusingly meagre. The following what this would mean, the most extensive 'Universal' gazetheer must appear amusingly meagre. The following are among the noteworthy works of general scope: Ferrarius, edited by Baudrand (fol. Paris, 1670); Bryce of Exeter, Univ. Geog. Diet. on Grand Gazetteer (2 vols in 1, fol. Lond. 1759; a remarkable bit of work); Brooko (8vo, Lond. 1775; 16th ed. 1815); Walker, edited by Capper (8vo, Lond. 1815); Cruttwell (1798), afterwards incorporated in the Edinburgh Gazetteer (1 vol. 1822; 2d ed. 6 vols. 1839); Landmann (8vo, Lond. 1835); Macculloch (1841–42); Thomson (8vo, Edin. 1842); Fullarton (25,000 names; 7 vols. Edin. 1850; Blackie's Imperial (2 vols. Glasgow, 1850); Johnston (1850; new ed. 1877); Lippincott, Pronouncing Gaz. of the World (Phila. 1865; new ed., with 125,000 places, 1880); Bouillet, Diet. d'Hist. et de tho, (1857); Knight's Encyclopædiu (geog. division); Ritter's Geog. stat. Lexthon (2 vols. Leip. 1874, edited by Henne am Ehyn; new ed. edited by Lagai, 1883); Saint-Martin, a vast work still in progress (4to, Paris, 1875, &c.); Oliver and Boyd (8vo, Edin. 1880); Metzger Geog. stat. Welt-Lexthon (8vo, Stutt. 1888). Special Gazetteers—

Special Guzetteers-AMERICA (NORTH). - American Gazetteer (3 vols. Lond.

AMERICA (NORTH), —American Gazetteer (3 vols. Lond. 1762); Thomson (4to, Lond. 1812); Davenport (8vo, New York, 1842); Kidder (Burley's, 8vo, Phila. 1876); Colange, U.S. Gazetteer (8vo, Cincinn. 1884).

ANCIENT GEOGRAPHY.—Echard (12mo, Lond. 1715); Maobean (8vo, Lond. 1773); Adam (8vo, Edin. 1793); Smith (2 vols. 8vo, 1852-57).

AUSTRALILA.—Gordon & Gotoli's Australian Handbook, incorporating New Zealand, &c. (20th annual issue, 1888).

AUSTRIA-HUNGARY.—Unilauft, Geog. Namenbuch (1885), and local lexicons issued by Statistical Commission.

BRITISH EMPIRE.—Macculloch (1837); Knight (2 vols. 8vo, Lond. 1853).

BRITISH EMFIRE.—Macculloch (1837); Knight (2 vols. Svo, Lond. 1853).

COMMERCIAL—Peuchet (6 vols. 4to, Paris, 1800); Macculloch (8vo, Lond. 1832; new ed. 1882).

EGYPT (ANGIENT).—Brugsch (Leip. 1877–80).

ENGLAND.—William Lambard (born 1836), the writer of the first county history, is also the author of the first gazetteer of England, though the work did not appear in print till 1730. A Book of the Names of all Parishes, de. (4to, Lond. 1657); John Admns, Index Villuris (fol. Lond. 1630); Whatley, England's Grazetter (3 vols. 12mo, Lond. 1751); Luckombe (3 vols. 12mo, Lond. 1751); Luckombe (3 vols. 12mo, Lond. 1790); Carlisle (2 vols. 4to, Lond. 1808); Capper (8vo, Lond. 1808); Gorton (3 vols. 8vo, Lond. 1831–33); Ball (8vo, Glasgow, 1832); Cobbett (8vo, Lond. 1832); Lewis (7th ed. 4 vols. 4to, Lond. 1849); Ungdale & Blanchard (8vo, Lond. 1860); Wilson (2 vols. 8vo, Edin. 1866-69).

FRANCE.—Few countries, if any, are unore thoroughly

France.—Few countries, if any, are more thoroughly gazetteered than France. It is enough to mention Gindro de Nancy (1874), Joanne (3d ed. 1886), and the great series of departmental gazetteers brought out by the ministry of Public Instruction (1861, &c.).

ministry of Public Instruction (1851, &c.).
GERMANY.—Neumann, Geographisches Lexikon des Deutschen Reiches (Leip. 1883).
GREAT BRITAIN.—Sharp (2 vols. Lond. 1863); Hamilton (3 vols. 4to, Lond. 1858); Beeton (8vo, Loud. 1870); Bartholomew (60,000 names, 8vo, Edin. 1887).
HOLLAND.—Van der Aa (Gonda, 1855); Heringa (Utrecht, 1874); Witkamp (1875).
INDIA.—Hamilton (8vo, Lond. 1815); Thornton, Gaz. of the Countries adjacent to India on the N.W. (2 vols. 1844); Thornton, Gaz. of the Territories under the E. I. Company (4 vols. 1851; 1 vol. 1857, new ed. by Sir Roper Lethbridge and A. N. Wollaston, 8vo. 1886); Hunter, Gaz. of India (20 vols. 8vo, 1875-77; 2d ed. 1885-87).

Numerous gazetteers for the several states have been

compiled at the cost of the government; some of them, as that on Afghamstan, are hardly obtainable.

ITALY.—Zuccagni Orlandini, Corografia (15 vols. 1844, &c.); Repetti, Diz. della Toscana (6 vols. Flor. 1833-46); Amati (8 vols. Flor. 1868, &c.); Altavilla (8vo, Turin, 1875)

IRELAND.—Seward (12mo, Dublin, 1789); Carlisle (4to, Lond. 1819); Lewis (4to, Lond. 1837); Lawson (12mo, Edn. 1842); Parliamentary Gazetteer (3 vols. 8vo, Lond. 1844-46); Leggatt (8vo, Lond. 1879).
RUSSIA.—Semenoff, in Russian (1862-86).

1875).

Russia.—Semenoff, in Russian (1862-86).
Scottand.—Macpherson, Geographical Illustrations of Scottish History, containing the names mentioned in Chronicles, &c. (4to, Lond. 1796); Gazetteer (8vo, Dundec, 1803; 2d ed. Edin. 1806); Carlislo (2 vols. 4to, Lond. 1813); Webster (8vo, Edin. 1817); Chambers (8vo, Edin. 1832); Topographical... Gazetteer (2 vols. 4to, Glasgow, 1842); Comprehensive Gazetteer (12mo, Glasgow, 1846); Wilson (2 vols. 8vo, Edin. 1854-57); Ordnance Gaz. (cdited by F. H. Groome, 3 vols. 8vo, Edin. 1892-85)

Edin. 1882-85).

SPAIN.—Madoz (1816-50), Mariana y Sanz (1886).
SWEDEN.—Hist.-yr.og., Lex. (8vo, 7 vols. Stockholm,
1859-66); Rosenberg (1881-83).
SWITTERLAND.—Weber (2d cd. 1886).
Compare articles on the several countries.

Gazogene. See AERATED WATERS.

Gearing, a term applied to the machinery which communicates motion from one part of a which communicates motion from one part of a machine to another, and may consist of toothed-wheels, endless bands, &c. When the communication is interrupted, it is out of gear; and when restored, in gear. Stratight gearing is used when the planes of notion are parallel; bevelled gearing, when the direction is changed. Gearing may also be 'multiplying' or retarding—i.e. increasing or diminishing the original velocity. See Where L.

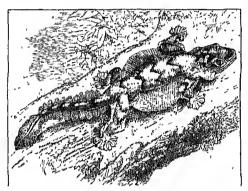
diminishing the original velocity. See WHEEL.

Gebhardt, Oskar von, was born at Wesenberg in Esthonia, 22d June 1844, studied theology at Dorpat, Tübingen, Erlangen, Güttingen, and Leipzig, and since 1875 has been engaged as a librarian at Strasburg, Leipzig, Halle, Güttingen (1880), and Berlin (1884). He has edited Patrum Apostolicorum Opera (with Harnack and Zahn; 3 vols. Leip. 1875-78), Evangeliorum Codex Russanensis (with Harnack; 1880), and Texte und Untersuchungen zur Geschichte der altehristlichen Litteratur (with Harnack; vols. i.-v. 1883-88). Since 1881 he has re-edited Tischendorf's text of the New Testament. the New Testament.

Gebir, or GEBER. Under this name are current several works on alchemy and chemistry. history of the real author is so shrouded in mystery nstory of the real author is so shrouded in mystery that his existence has been denied, and Gebir looked upon as a mythical personage. He is usually identified with Jabir ibn Haijan, a celebrated Arabic alchemist in the 8th century. His birthplace is given differently as Harran in Mesopotamia, Tarsus, and Kufa; he is said to have resided at Damascus and Kufa, and to have died in 776. The principal writings which so under the resident at Damascus and Kura, and so have died in 776. The principal writings which go under the name of Gebir, and several of which have been translated into English, are Summa Perfectionis (see Alchemy); Summa Collectionis Complementi Secretorum Natura ; Testamentum ; Liber Investigationis; and two tractates on spherical triangles and astronomy.

Gebweiler (Fr. Guebwiller), a town of Alsace-Lorraine, at the foot of the Vosges, 15 miles SSW. of Colmar, has a 12th century church, cotton spinning and weaving, dye-works, machine-factories, and vineyards. Pop. (1885) 12,395.

Gecko, a group of lizards constituting a family, Geckotide, which have been divided into a large number of genera, including more than 200 species. The geokos are of small size, the colours of most of them are dull, and the small granular scales with which they are covered are in general mingled with tubercles. The legs are short, the gait usually slow, measured, and stealthy, although geckos can also run very nimbly when danger presses, and often disappear very suddenly when they seem almost to be struck or caught. The feet are remarkable, heing adapted for adhering to smooth surfaces, so that geckos readily climb the smoothest trees or walls, or creep inverted on ceilings, or hang on the lower side of the large leaves in which tropical vegetation alamnds. The body and tail are never crested, but are sometimes furnished with lateral membranes, variously festomed or fringed. The lateral membrane is sometimes even so large as to be of use to arboreal species in enabling them to take long leaps from branch to branch. The geckos feed chiefly on insects. They are more or less nocturnal in their habits. They are notives of warm climates, and



Fringed Gecko (Ptychozoon homalocephalum).

are very widely distributed over the world, being especially numerous in the Indian and Australian regions. Two species are found in the south of Europe, both of which frequently enter houses, as do the geckos of Egypt, India, and other warm countries. The name gecko is derived from a peculiar cry often uttered by some of the species, and which in some of them resembles syllables distinctly pronounced, whilst others are described as enlivening the night in tropical forests by a harsh cackle. The geckos have, in almost all parts of the world where they are found, a bad reputation as venomous, and as imparting injurions qualities to food which they touch; but there is no good evidence in support of any such opinion, in accordance with which, however, an Egyptian gecko is even known as 'the father of leprosy.'

Gcd, William, inventor of the art of stercotyping, was an Edinburgh goldsmith, who from 1725 onwards bent his energies to the Stereotyping (q.v.) of books. He entered into partnership with a London capitalist, and was commissioned by the university of Cambridge to stereotype some prayerbooks and bibles, though only two prayer-books were actually finished; for, owing to the unfair treatment of his partner and the injustice of his own workmen, Ged was compelled to alandon the enterprise. He returned to Edinburgh a disappointed man, and died there on 19th October 1749. His most noteworthy production after his return lonne was a stereotyped edition of Sallust (1739). See Nichols's Memoirs (1781).

Geddes, ALEXANDER, a biblical critic, translator, and miscellanoous writer, was born at Arradowl, in the parish of Ruthven, Banfishire, in 1737. His parents were Roman Catholics, and he was educated for a priest, first at Scalan, a monastic

seminary in the Highlands, next at the Scots College, Paris, where he acquired a knowledge of Hebrew, Greek, Italian, French, Spanish, German, and Dutch. In 1764 he returned to Scotland, and five years later took a cure of souls at Auchinhalrig in Banffshire, where he remained for ten years. Here he made himself conspicuous by a breadth of sympathy with the Protestants around him, so extraordinary as to lead to his being deposed from all his ecclesiastical functions. The university of Aberdeen made him LL.D. Geddes now resolved to betake himself to literature, and proceeded to London in 1780. He had long planned a translation of the Bible into English for the use of Roman Catholics, and he was now, through the munificence of Lord Petre, enabled to devote himself to the work. The first volume appeared in 1792; the second in 1793, carrying the translation as far as the end of the historical books; and the third was issued in 1800, containing his Critical Remarks on the Hebrew Scriptures. These volumes, especially the last, are startlingly heretical, and offended Catholies and Protestants alike. They exhibit as thorough-going Rationalism as is to be found in Eichhorn or Paulus, climinating the supernatural element from the Scriptures; such stories as that of the Creation in Genesis being merely poetical or philosophical fictions, and such figures as Moses merely men who by a pions fraud contrived to add a divine sanction to mere human wisdom. These opinions naturally enough exposed Geddes to the charge of infidelity. He died in London, 26th February 1802. His poems, even Bardomachia, are now of no importance. See the Life by Dr Mason Good (1803).

Geddes, Andrew. a painter, was born at Edinburgh in 1789. He began to study at the Royal Academy in London in 1807, and first exhibited in Edinburgh, producing successful pictures in 1808 and in 1810, in the latter year the 'Dranght-players.' This, along with 'The Discovery of the Scottish Regalia,' exhibited at the Royal Academy, London, in 1821, and 'Christ and the Woman of Samaria,' are esteemed his best pictures, though he also excelled in portrait-painting. In 1831 he was elected an Associate of the Royal Academy of London, and died in 1844.

London, and died in 1844.

Geddes, Jenny, an obscure woman whose name is memorable in tradition from her having begin the riotous resistance to the introduction of a Service-book prepared by Laud into the Church of Scotland in 1637. The day fixed for this hated innovation was Sunday the 23d July, and an immense crowd filled the High Kirk of St Giles, Edinburgh, on the occasion. On Dean Hanna's beginning to read the collect for the day, Jenny Geddes, who kept a vegotable-stall in the High Street, threw her stool at his head, shouting: 'Deil colic the wame o' thee; ont, thon false thief! dost thon say mass at my lng?' A great uproar at oneo arose, and both dean and bishop (David Lindsay) had to flee for their lives from the fury of the mob. This tunnult proved the deathblow of the liturgy in Scotland. This famous exploit is unfortunately lacking in historical evidence beyond a fairly early and persistent tradition. Still Sydserf in 1661 mentions 'the immortal Jenet Geddes, princess of the Trone adventurers,' as having burned 'her leather chair of state'—evidently an object already famous—at the Restoration bonfires, and the story appears with name and full detail in Phillips' Continuation of Buker's Chronickle, published in 1660, the heroine being stated as 'yet living at the time of this relation.' An idle attempt has been made to set up a rival claimant in one Barbara Hamilton or Mein, but Jenny Geddes still

keeps her place among the worthics of Scottish history. The credulons may even see her stool in the Antiquaries' Museum at Edinburgh. See Dr Lees's St Giles', Edinburgh (1889).

Gedrosia. See Beluchistan.

Geelong, a city of Victoria, is picturesquely situated on the south side of Corio Bay, 45 miles SW. of Melbourne by rail. It is well laid out, abounds in attractive shops, and has some hand-some buildings. The river Barwon forms the some buildings. sonthern boundary of the city, and 3 miles farther spreads into the Connewarre Lakes, falling into the sea at Point Flinders. The gold discoveries in 1851 added to the prosperity of Geelong, which had been incorporated as a town in 1849, and became a principal seat of the wool trade—the first woollen mill in Victoria being erected in Geelong. woollen mill in Victoria being erected in Geelong. Alongside of the railway jetty the largest ships can load and discharge, and there are three other jetties for smaller vessels. Through the bar at the entrance to Corio Bay a channel has been dredged for the convenience of steamer traffic. The district is exceedingly fertile; the Barrabool Hills on the west bank of the Barwon are covered with farms and orchards, but the vineyards have been destroyed under the Phylloxera Act. Limeters and a kind of marble are found in the stone and a kind of marble are found in the neighbourhood. There are various industries carried on, especially the manufacture of woollen cloths and paper, meat-preserving, tanning, rope-making, fishing, &c. The Exhibition Hall and general produce exchange, theatre, and assembly rooms com-bined, stands in the market square. The city is lighted with gas; is supplied with water from Stony Creek reservoirs and the river Moorabool; and has two parks, botanical gardens, government buildings, a town-hall, a new post-office (1889), an excellent hospital, a chamber of commerce, mechanics' institute, grammar-school, and five newspapers. Corio Bay is a favourite bathingresort; and on the eastern boundary of the town are extensive limestone quarries. Pop., including the suburbs, (1871) 22,618; (1889) 20,000, of whom 10,000 were within the nunicipal boundary.

Geelvink Bay penetrates 125 miles southward into the western arm of New Guinea. Its entrance, some 155 miles wide, is protected by several islands; its shores are well wooded, flat, and fertile, but unhealthy. The hay is separated by a narrow isthmus from the Alfura Sea on the south, and by a still narrower isthmus from McClure Gulf on the west.

Geesteminde, a seaport of Prussia, situated at the confluence of the Geeste with the Weser, immediately SE. of Bremerhaven, owes its importance to the docks and wharves constructed in 1857-63. It has also a school of navigation; imports petroleum, tobacco, rice, coffce, timber, and corn; and carries on various industries connected with shipping. Pop. 4796.

Geez, or Ge'ez. See Ethiopia.

Geffe, chief town of the Swedish län of Geffeborg, is situated on an inlet of the Gulf of Bothnia, 71 miles by rail N. by W. of Upsala. The port for Dalecarlia, Gefle ranks third among the commercial towns of Sweden, coming next to Stockholm and Gothenburg. Among the noteworthy buildings are the eastle (16th and 18th century) and the town-hall. Geffe, which has been rebuilt since its destruction by fire in 1869, has a school of navigation, and carries on shipbuilding, the manufacture of sail-cloth, cotton, and tobacco, and fisheries. It carries on an active trado, the principal exports being iron, timber, and tar; whilst its imports consist chiefly of corn and salt. Pop. (1874) 16,787; (1887) 21,508.

Gegenbaur, Karl, German comparative anatomist, was born on 21st August 1826, at Witrzburg, where he was educated, and where he taught until 1855. In this year he was called to a unedical professorship at Jena, but from 1858 to 1873 he taught principally anatomy. Removing to Heidelberg in 1873, he has since that date continued to lecture on the same subject. His fame rests upon his Grandriss der vergleichenden Anatomie (2d ed. Leip. 1878), which was translated into English that same year by F. J. Bell and E. Ray Lankester. Besides this he has published Lehrbuch der Anatomie des Menschen (1883; 2d ed. 1885), and since 1875 has edited the Morphologisches Jahrbuch.

Gehenna, the Greek form of the Hebrew Gehinnom, or Valley of Hinnom. This valley, or rather narrow gorge, lies south and west of the city of Jernsalem. Here Solomon built a high place for Moloch (1 Kings, xi. 7), and indeed Gehenna seems to have become a favourite spot with the later Jewish kings for the colebration of idolatrons rites. It was here that Abaz and Manasseh made their children pass through the lire 'according to the abomination of the heathen;' and at its south-east extremity, specifically designated Tophet ('place of burning'), the hideous practice of infant sacrifice to the lire gods was not unknown (Jeremiah, vii. 31). When King Josiah came forward as the restorer of the old and pure national faith he 'defiled' the Valley of Hinnom by covering it with human hones, and after this it appears to have become 'the common cesspool of the city, into which its sewage was conducted to be carried off by the waters of the Kidron, as well as a laystall, where all its solid filth was collected. Hence, it became a lunge uest of insects, whose larve or "worms" fattened on the corruption. It is also said that fires were kept constantly burning here to consume the bodies of criminals, the carcasses of animals, and whatever other offal might be combustible. Among the later Jews Gehemua and Tophet came to be symbols for hell and torment, and in this sense the former word is frequently employed by Jesus in the New Testament—e.g. Mark, ix. 47, 48.

Geibel, EMANUEL von, one of the most popular of modern German poets, was born at Lübeck on 18th October 1815. After his studies at Bonn he lived at Berlin, in the poetical circle of Chamisso, Gandy, and Kugler; next went to Athens in 1838 as tutor in the family of the Russian ambassador, but returned to Lübeck two years later to work up the material he had collected in Greece, and to pursue his studies in Italian and Spanish literature. At the beginning of 1843 a pension of 300 thalers was bestowed upon him by the king of Prussia. Geibel now resided alternately at St Goar with Freiligrath, at Stuttgart, Hanover, Berlin, and Lübeck, till in 1852 he was appointed professor of Æsthetics in the university of Munich by the king of Bavaria—a post he retained till 1868, when he retired to Lubeck. He contributed translations from the Greek poets to the Classische Studien of Erust Chrisis (1840), and in the same year published his own Gedichte (100th ed. 1884), the beauty and religious tone of which made them at once great favonuties with the Germans. The results of his Spanish studies were the Spanische Volkslieder und Romanzen (1843), which were followed by the Spanisches Liederbuch (1852), published in conjunction with Paul Heyse. In 1868 he published another tragedy of Brunchild, and in 1864 his Gedichte und Gedenkblitter. In 1868 he published another tragedy called Sophonishe. He died at Lübeck, 6th April 1884. His poems are distinguished by fervour and truth of feeling, richness of fancy, and a certain pensive melancholy, and have procured

him a popularity—especially among cultivated women—such as no poet of Germany has enjoyed since the days of Uhland. An edition of his Gesummelte Werke was published at Stuttgart in 8 vols (1883 et seg.). See Lives by Gaedertz (1885) and Litzmann (1887).

Geiger, ABRAHAM, a Jewish scholar, was born at Frankfort-on-the-Main, May 24, 1810. According to old rabbinical practice, his teachers were his father and elder brother, till he reached the age of eleven. After that he went to the gymnasium, next to the universities of Heidelberg and Bonn, devoting himself to philosophy and the oriental languages. His prize essay, Was hat Mohammed aus dem Judenthum aufgenommen? was published in 1838. In November 1832 he was called as rabbi to Wiesbaden, and there he devoted himself with great especially in its relation to practical life. In 1835 he joined with several able scholars in starting the Zeitschrift für Judische Theologie. In 1838 he was called as second rabbi to Breslan, and here he came into serious conflict with the more conservative Jews, but carried with him all men of learning and thought. From 1863 he officiated as rabbi at Frankfort, whence he was called in 1870 to Berlin. Here he died, 23d October 1874, editing from 1862 tiel the last the Judische Zeitschrift. Of his many books may be named his striking Urschrift und Uebersetzungen der Bibel (1857), and the elaborate history, Das Judenthum und seine Geschichte (1864-65). An Allgemeine Einleitung, and 5 vols. of Narhgelassene Schriften, were edited by his son in 1875. See his Life by Screiber (Löban, 1880).

Geiger, LAZARUS, philologist, was born at Frankfort, 21st May 1829, studied at Bonn, Heidelberg, and Wirzburg, and in 1861 became a teacher in the Jewish school at Frankfort. He died 29th August 1870. He wrote much on the relation of language and thought, affirming that without language man must have been without without language man must have been without reason. His principal works are Sprache und Vernunft (1868-72), and Ursprung der Sprache (1869; 2d ed. 1878). See Lives by Peschier (1871) and Rosenthal (1883).

Geijer, Eric Gustaf, Swedish historian, was horn at Ransäter, in Vermland, January 12, 1783. He was sent at sixteen to the university of Upsala, and in 1803 gained the prize awarded by the Academy of Stockholm for the best essay on the Swedish administrator, Sten Sture. From this period he devoted himself to the study of the history of his native country. Beginning to leeture at Upsala in 1810, he was shortly afterwards nonlinated to a post in the office of the National Archives; in 1815 he was elected assistant-professor, and in 1817 professor of History at Upsala. Geijer exercised a marked influence on the poetic no less than on the historical literature of Sweden. As early as 1810 he, along with several friends, founded the Gothie Society, in whose magazine, the *Iduna*, first appeared several of Geijer's best poems, and the early cantos of Tegnér's *Frithiof*. Great as is the value of Geijer's historical works, he unfortunately did not complete any one of the vast undertakings which he planned. Thus, of the Svea Rikes Higher, or Records of Sweden (1825), which were to have embraced the history of his native country from mythical ages to the present time, he finished only the introductory volume. This, however, is a thoroughly good critical inquiry into the sources of legendary swedish history. His next great work, Svenska Folkets Historia (3 vols. 1832-36), was not carried beyond the death of Queen Christina. To Geijer was entrusted the task of examining and editing the papers which Gustavus III. had

bequeathed to the university of Upsala with the bequeathed to the university of Upsala with the stipulation that they were not to be opened for fifty years after his death. They appeared in 1843-46. Geijer died at Stockholm, 23d April 1847. Of his other historical and political works we need only mention specially The Condition of Sweden from the Death of Charles XII. to the Accession of Gustarus III. (1838), and Feudalism and Republicanism (1844). Besides these he edited the continuation of Fant's Scriptores Rerum Succious Welfis Key (1818-95) and Playible Sampala. carum Medii Ævi (1818-25), and Thorild's Samlade Skrifter (1819-25), and, along with Afzelius, a collection of Svenska Folkvisor (1814-16). During the last ten years of his life Geijer took an active part in politics; but, although his political writings possess great merit, the very versatility of his powers diverted him from applying them methodically to the complete elaboration of any one special subject. He was also known to his countrymen as a musician and composer of no mean order. His collected works were published by his son, with a biographical sketch (13 vols. 1849-56; new ed. 1873-75).

Geikie, ARCHIBALD, F.R.S., geologist, born at Edinburgh in 1835, and educated at the High School and university. In 1855 he was appointed to the Geological Survey; in 1867 became director to the Survey in Scotland; from 1870 to 1881 was believed to the Survey in Scotland; from 1870 to 1881 was Murchison Professor of Geology in Edinburgh University; and in 1881 was appointed directorgeneral to the Survey of the United Kingdom, being at the same time placed at the head of the Museum of Practical Geology, London. He is the author of Story of a Boulder (1858); Phenomena of the Glacial Drift of Scotland (1803); The Scenery of Scotland viewed in connection with its Physical Geology (1865; 2d ed. 1887); Memotr of Sir R. Murchison (1874); and a Text-hook of Geology (1882); besides numerous class-books, primers, &c. on geology. Murchison Professor of Geology in Edinburgh Uni-&c. on geology.

Geikie, James, LL.D., geologist, was born at Edinburgh in 1839, and received an education similar to that of his brother Archibald. Having served on the Geological Survey of Scotland from 1861 to 1882, he succeeded his brother as Murchison Professor of Geology in Edinburgh University. He is the author of The Great Ire Age in its Relation to the Antiquity of Man (2d ed. 1877); Prehistoric Europe (1881); Outlines of Geology (1886; 2d ed. 1888); a translation of Songs and Lyries by H. Heine and other German Poets (1887); besides a large number of geological maps, sections, and memoirs published by the Geological Survey; and he has written the geological articles for the present edition of this work. He became F.R.S.E., 1871; F.R.S., 1875; LL.D. (St Andrews), 1875; D.C.L. (Durham), 1889; and is a Fellow of many learned societies at home and abroad.

Geiler von Kaisersberg, Johannes, a famous pulpit-orator of Germany, was born at Schaffhausen, 16th March 1455, studied at Frei-burg and Basel, and in 1478 became preacher in the ourg and basel, and in 1478 became preacher in the eathedral of Strasburg, where he died, 10th March 1510. Geiler von Kaisersberg was one of the most learned and original men of his age; his sermons, usually composed in Latin and delivered in German, are marked by great cloquence and carnestness, nor do they disclain the aids of wit, sarcasm, and wideling the Of his printings, which have now hess, for to they drawn the actus of whis sates and and ridicule. Of his writings, which have now become very rare, may be mentioned Das Navrenschiff (Lat. 1511; Ger. by Pauli, 1520), comprising 142 sermons on Sebastian Brandi's Navrenschiff; Dan Janier Schafe (1510). Dan Sealen Provider Das Irrig Schaf (1510); Der Seelen Paradies (1510); Das Schiff der Pönitenz und Busswirkung (1514); Das Buch Granatapfel (1511); Christliche Pilgerschaft zum Ewigen Vaterland (1512); and Das Evangelienbuch (1515). See the studies by Ammon (Erl. 1826), Dachenx (Paris and Strasb. 1876), and Lindemann (Freiburg, 1877).

Geissler Tubes. See VACUUM TUBES.

Gela, an ancient city on the southern coast of Sicily, near the site of the modern Terramova. It was founded by a colony of Rhodians and Cretans, 690 B.C., and grew so rapidly that as early as 582 it was able to found a colony at Agrigentum, which was soon to outstrip Gela itself (see GELON). Here Æschylus died and was buried, 456 nc., and here Apollodoms was born. In 280 its inhabitants were transplanted to Phintias.

Gelasius, the name of two popes.-Gelasius I., an African by birth, succeeded Felix III. in 492, and was one of the earliest bishops of Rome 492, and was one of the earliest bishops of Rome to assert the supremacy of the papal chair, not only over temporal authority, but also over general councils of the church. He vicorously repressed Pelagianism, which was spreading in Dalmatia, renewed the han of his predecessor against the oriental patriarch, drove out the Manicheans from Rome, and died in 496. There are extant a treatise of his against the Eutychians and Nestorians, De duabus in Christo naturis, several letters, and a Codex Sacramentarius.—(Pelasus letters, and a Colese Sacramentarius.—CELASUS II., formerly John of Gaeta, was educated at the Benedictine abbey of Monte Cassino, was cardinal and chancellor under Urban II. and Paschal II., and chancellor under Urban II. and Paschal II., and on the death of the latter in the June of 1118 was chosen pope by the party hostile to the Emperor Henry V. The imperial party at Rome under the Frangipani seized his person, but were forced to set him free by the menacing attitude of the mob. The new pope fled before the advancing imperial troops to Gacta, where he first received his consecration, and whence he fulminated the thunders of excompunication against ated the thunders of excommunication against Henry V, and Gregory VIII., the antipope he had set up. Soon after he was able to return to Rome, but ene long had to betake himself for protection to France, where he died in the monastery of Cluguy, early in 1119.

Gelatine, in Chemistry. Little is yet deli-nitely known of the chemical nature of gelatine. It consists approximately of carbon 49 6, oxygen 25 4, nitrogen 18 3, and snlplmr about 0 1 per cent. It is soluble in hot water, in acetic acid, and in cold sulpluric acid, and is insoluble in alcohol, ether, and other organic liquids; the aqueons solution is precipitated by tannic acid, chrome alum, and corro-ive sublimate, but not by most acids, salts, or alkalies in dilute solution. Gelatine may be purified by dissolving it in water and pouring the solution into a large bulk of alcohol; the clot which forms consists of nearly pure gelatine, containing only a trace of ash. By dry distillation relating visible a constitute of substantians. distillation gelatine yields a quantity of carbonate of ammonia, and a foul smelling brown oil containing carbonate, sulphide and cyanide of ammonia,

ing carbonate, sulphide and cyanide of animonia, aniline, methylamine, picaline, and a number of pyridine bases. Gelatine solution dissolves lime and calcium phosphate much more freely than cold water, forming with the latter a definite compound, which probably forms part of the tissue of bones. In Technology, the term gelatine, although usually applied to only one variety of the substance obtained by dissolving the soluble portion of the gelatinous tissnes of animals, nevertheless properly belongs also to Isinglass (q.v.) and Glue (q.v.), which are modifications of the same material. Vegetable jelly is also analogous. Gelatine and glue signify the more or less pure and earefully prepared jelly of mammalian animals; but the term isinglass is only applied to certain gelatinous parts of fishes, which from their exceeding richness in gelatine, are usually merely dried and used without any other preparation than that and used without any other preparation than that

of minute division for the purpose of facilitating their action.

Gelatine proper is prepared for commercial pur-Gelatine proper is prepared for confiderent purposes from a variety of animal substances, but chiefly from the softer parts of the hides of oxen and calves and the skins of sheep, such as the thin portion which covers the belly, the ears, &c.; also from bones and other parts of animals. One of the best, if not the best of the varieties of gelatine manufactured in Great Britain, is the 'sparkling what is a Marking of Morror Cov. of Govern part & Marking manufactured in Great Britain, is the 'sparkling gelatine' of Messrs Cox of Gorgie, near Edinburgh, which is remarkable for its great purity and strength, or gelativising power, and is purified by processes patented by them. The materials they use are carefully selected portions of ox only imported from South America. Another preparations of the Machan of Edinburgh from South tion, made by Mackay of Edinburgh from calves'-feet, is deserving of special mention.

The general method adopted with skin-parings or hide-clippings is first to wash the pieces very or nuc-employes is first to wash the pieces very carefully; they are then cut into small pieces and placed in a weak solution of caustic soda for a week or ten days. When this process of digestion has been sufficiently carried on, the pieces of skin are then transferred to revolving cylinders supplied with an alumdance of clean cold water, and afterwards are placed of the resident in another days have been feel. wards are placed still wet in another chamber lined with wood, in which they are bleached and purified by exposure to the funes of hurning sulplur; they next receive their final washing with cold water, which removes the sulphurous acid. The next which removes the sulphurous acid. The next operation is to transfer them to the gelatinising pots. Water is poured in with the pieces, and kept at a high temperature by means of the steam in the cases surrounding the pots.

By this means the gelatine is quite dissolved out of the skin, and is strained off whilst still hot; it is poured out in thin layers, which as soon as they are sufficiently cooled and consolidated are cut into small plates, usually oblong, and laid on nets, stretched horizontally, to dry. It is then ent into slueds and is ready for market.

Another process, introduced by Mr Swinchurne, consists in treating pieces of calfskin by water alone, without the soda and sulphur processes; the pieces, after simple washing, being transferred at once to the pots to be acted upon by the steam. Inferior gelatine is made from bones and other parts of animals; and it is understood that the cnormons number of rats killed in the sewers and abattoirs of Paris are used by the geletine-makers. The French manufacturers succeed better than any others in charifying these inferior gelatines, and they rarely make any others; they run their plates out very thin, which gives them greater transparency; and they colour them with most brilliant colours, and form very fine-rolled sheets, tempting the eye with an appearance of great delicacy and purity.

Gelatine should never be judged by the eye alone. Its purity may be very easily tested thus: quantity of boiling water; and then pour upon it a small quantity of boiling water; if pure it will form a thickish, clear, straw-coloured solution, free from smell, but if made of impure materials it will give off a very offensive odour, and have a yellow glucy consistency. No article mounted requires consistency. No article manufactured requires such careful selection of material and such nice and cleanly manipulation to ensure a good marketable character; and those anxious for purity should avoid all artificially coloured varieties, however temptingly got up, unless they are required for morely decorative purposes and not for food. Of late years the commercial uses have greatly increased. Gelatine is the foundation of the dryplate system of photography, and by its means the science has been revolutionised and its capabili-ties extended to an extraordinary degree. To the ties extended to an extraordinary degree.

printing process as employed by Messrs Goupil of Paris and others the world is indebted for cheap and at the same time highly artistic copies of many admirable pictures. It is further very extensively used by druggists for coating pills and nauscons drugs, liquid and solid, which are thus rendered tasteless; and by confectioners for some kinds of sweetmeats. For the value of gelatine as food, see DIET; and for applications of gelatine to the purpose of book illustration, see ILLUSTRATION. See also PHOTOGRAPHY.

One of the qualities of gelatine is its power to form chemical combinations with certain organic matters; hence, when it is mixed and dissolved in a fluid containing such matters, it combines, and the compound is precipitated. It would appear that this combination, however, is threadlike in its arrangement, and that the crossing threads form a fine network through the fluid, which, in falling, carries down all lloating substances that by their presence render the liquid cloudy; hence its great value in clarifying beer and other liquids. For this reason isinglass, which has been found the best gelatine for the purpose, is very largely con-

sumed by brewers.

Various kinds of animal food are valued for the abundance of gelatine they contain, as the Trepang and Beche-de-Mer (species of Holothuria), sharks fins, fish-maws, ray-skins, elephant hide, rhinoceros hide, and the softer parts, all of which are luxuries amongst the Chinese, Japanese, Siamese, Malays, &c. Turtle-shells, or the upper and lower parts of the shield (carapace and plastron), constitute the callipash and callipoe of the epicure, and form, in the hands of the experienced coak, a rich gelatinous soup. The fleshy parts of the turtle, calves' head and feet, and many other things might be enumerated as valuable chiefly in consequence of their richness in this material.

Gelderland. See GUELDERLAND.

Gelidium, a genus of Algae Floridae (see Seaweeds). G. cartilagineum and the allied Gracilaria lichenoides are said to be utilised in the building of the edible birds'-nests, so much prized by the Chinese (see, however, Edible Birds'-Nest). These and allied species are largely used for food in the East, as yielding wholesome jellies.

Gell, Sir William, English antiquary and classical scholar, was born at Hopton in Derlyshire in 1777. He was educated at Jesus College, Cambridge, graduating in 1798, after which he held for some time a fellowship at Emmanuel College. He devoted his time principally to antiquarian research and geographical studies, and published works on the topography of Troy (1804), Pompeii (4 vols. 1817-32), and Rome (1834); itineraries of Greece (1810), the Morea (1817), and Attica (1817), as well as a book on the Geography and Antiquities of Ithaca (1808), and a Journey in the Morea (1823). Of these works the best was that on the antiquities and topography of Pompeii. For some years after 1814 he was one of the chamberlains of Caroline, consort of George IV. He died at Naples, February 4, 1836.

Gellert, or Killiam, the famous dog of Prince Llewellyn, which, left in charge of his infant child, after a desperate battle killed a wolf that had entered the house. The prince on his return, seeing the cradle overtuned and the floor sprinkled with blood, thought the hound had killed his child, and at once plunged his sword into its side. A moment after he found the child safe under the cradle and the wolf lying dead, and saw too late the faithfulness of his dog. Gellert was buried under a tomb which stands to this day in the lovely village of Beddgelert, near the south base of Showdon. The story is the subject of a

beautiful ballad by the Hon. William-Robert Spencer (1769-1834), second son of the fifth Earl of Sunderland, who became also third Duke of Marlborough. He was the father of two colonial bishops, and the author of much fashionable poetry long forgotten, with this one ballad that will not die.

long forgotten, with this one ballad that will not die.
Welshmen not only show the grave of the faithful Gellert, but fix 1205 as the date at which he was given to the prince by his father-in-law. Unfortunately for them the story was long before enrrent in Enrope, with a snake instead of a wolf as the enemy. It is the first tale in the oldest Latin prose version of the Seven Wise Masters, entitled Dolopathos, written about 1184, and nearly a century before (about 1090), it had existed in Syntipas, a Greek version of the Book of Sindibád, the eastern prototype of the Seven Wise Masters. From the Latin Dolopathos, or from oral tradition, the story was taken into subsequent versions of the Wise Masters, and also into the Gesta Romanorum. It occurs also in the Liber de Donis of Eticune de Bourbon, who tells us that the grave was visited by the sick, and it reappears in the Historia Septem Sapientum Rome, the parent of Wynkyu do Worde's History of the Seven Wise Masters of Rome (1505). The story of the Dog and the Snake thus occurs in all the western group of the Book of Sindibád; and of eastern texts or of versions derived from these, it is found in the Syriae, Persian, Greek, Hebrew, Latin (John of Capna's Directorium Humanae Vitae), and the old Spanish (translated from an old Arabic version now lost). It does not occur in the modern Anabic version (the Seven Vazirs), which is incorporated with the Book of the Thousand and One Nights. In the Sindibiad Nama (written in 1874), a Persian metrical version, a cat is substituted for a dog. Again, in the Panchatantra version it is a mongoose or ichneumon that kills the snake; in the Hibpadesa it is a weasel. Dr Beal has translated a version from the Vinaya Pitaka of the Chinese Buddhist books (412 A.D.), itself said to be due to a umeh older Indian original, supposed to date from over 200 B.C. This Dr Beal considers the oldest form of the Panchatantra story. See vol. ii. of Popular Tales and Fictions (1887), by W. A. Clouston, who corrects some errors in the account in B

Gellert, Christian Fürchtegott, a German poet and moralist, was born July 4, 1715, at Hainichen, in the Erzgebirge, Saxony, and was educated at the university of Leipzig. After spending some years in teaching, in 1751 he received a professorship at Leipzig, where he lectured on poetry, eloquence, and morals, to large and enthusiastic audiences, nutil his death, 13th December 1769. His importance in German literature is due to the fact that around him gathered those who revolted against the pedantries and frigid formalities of Gottsched and his school, and thus pioneered the way for the more brilliant reaction of Goethe and Schiller. Gellert came to occupy this position partly on account of his writings, but more on account of his personal character. A man of sincere piety, a moral enthusiast, and with a genuinely good kind heart, he was beloved by his students, and they carried his authority beyond the walls of his lectureroom. His writings consist principally of Fabeln and Erzühlungen and Geistliche Lieder, both sets great favourites from the simplicity and naturalness of their style, and, in the case of the latter, their maffected piety. His Simmtliche Werke appeared in 10 vols. in 1769-74; new ed. 1867. See his Life by Döring (1833).

was buried under a tomb which stands to this day in the lovely village of Beddgelert, near the south base of Snowdon. The story is the subject of a contury of our era, and is supposed to have been born at Rome, and to have studied

philosophy at Athens, after which he practised law at Rome without abandoning his literary pursuits. His well-known work, the Noctes Attien, begun during the long nights of winter in a countryhouse near Athens, and completed during the later years of his life, is a collection of miscellaneous and ill-arranged matter on language, antiquities, history, and literature, in 20 hooks, of which the 8th is wanting. It contains many extracts from Greek and Latin authors no longer extant. The hest edition is that of Hertz (2 vols. Berlin, 1883–85); see also the same editor's Opuscula Gelliana (1886).

Gelnhausen, a town of Prussia, stands on the Kinzig and on the slopes of a vine-chal hill, 26 miles NE. of Frankfort-on-the-Main. Here, on an island in the Kinzig, Frederick Barbarossa built an imperial residence (the 'Pfalz'); and in the conferred upon the village the freedom of the empire. After being transferred to the counts of Hanan in 1435, (ichihansen began to decay. It has several old buildings, as the town-house, some towers, the Catholic church, 'princes' house, '&c. Pop. 3695.

Gelon, tyrant of Gela and afterwards of Syracase, was a seion of a noble family of the former city, and contrived to become successor to Hippocrates, its tyrant, in 491 B.C. Six years later he made himself master of Syraeuse also, which then became the seat of his government, and to which he transferred the majority of the inhabitants of Gela. His influence soon extended itself over the half of Sicily. Gelon refused to aid the Greeks against Xerxes, as they declined to comply with his demand that he should be appointed com-mander-in-chief. He because embroiled with the Carthaginians because of their attack upon his carhaginants because of their attack upon his ally, Theron of Agrigentum, and defeated them in a great victory at Himera, on the same day, according to tradition, on which the Greeks won the battle of Salamis. The elemency and wisdom of tielon rendered him so generally beloved that when he appeared marmed in an assembly of the people and declared himself reads to return by people, and declared himself ready to resign his power, he was unanimously hailed as the deliverer and sovereign of Syracuse. Gelon died in 478 B.C., and his memory was held in such respect a century and a half after, that, when Timoleon razed to the ground all the statues of former tyrants, those of Gelon alone were spared.

Gelsemium nitidum (G. semperrirens), the yellow or Carolina jasmine (nat. ord. Loganiacen), is a climbing plant of the Atlantic southern United is a chimbing plant of the Adamie sommer Connect States, having large, axillary, fragrant, clustered blossoms and perennial dark-green leaves. The dried rhizome and rootlets are used in medicine, and contain an alkaloid, gelsemine, $C_{11}H_{10}NO_{2}$, to which the plant owes its physiological action. When the newdored rhizome or any of the pharma-When the powdered rhizome, or any of the pharmaceutical preparations made from it, is taken internally in medicinal doses there ensues a feeling of languor, with slight depression of the circulation and lowering in the frequency and force of the pulse. In larger doses it acts as an active poison, causing eardiac depression, museular weakness, and marked disturbance of vision-wide dilatation of the pupil and frequently squinting and ptosis. central nervous system in man is also affected, the gait becomes staggering, general sensibility is much impaired, the respiration is slow and laboured, and the bodily temperature is lowered. If death results it is from failure of respiration. A solution of the alkaloid applied directly to the eye causes dilatation of the pupil and paralysis of accommodation. In medicine gelseminm is used to reduce the temperature in malarial and other sthenie fevers; it is also used in neuralgia, rhemnatism, pneumonia, plearisy, and other inflammatory diseases.

Gelsenkirchen, a modern mannfacturing town of Westphalie, 4 miles NW. of Bochum. It owes to coal and iron its rise from a mere village since 1860. Pop. (1880) 14,615; (1885) 20,289.

Gem, a term often used to signify a precions stone of small size, such as may be used for setting in a ring, or for any similar purpose of ornament; but sometimes by mineralogists in a sense which they have themselves arbitrarily affixed to it, for the purpose of scientific classification, as the designation of an order or family of minerals, generally hard enough to seratch quarts, insoluble in acids, infusible before the blowpipe, without metallic lustre, but mostly brilliant and beautiful. Among them are included some of the minerals which, in popular language, are most generally known as gems—ruly, sapplhire, spinel, topaz, beryl, emetald, tournaline, hyacinth, zircon, &c.—and some other rarer minerals of similar character; but along with these are ranked minerals, often coarser varieties of the same species, which are not gems in the ordinary sense of the word, as emery and common corundum, whilst diamond and some other precions stones, much used as gens, are excluded. See Streeter's Precious Stones and Gens (1879). While the term gen is thus used currently to denote jewels and precions stones, it is strictly applicable only to such hard and precions stones as have been worked by engraving. When the engraved design is sunk in the stone the gen forms an intaglio, signet, or seal, and when the subject is in relief the gem is a Cameo (q.v.). The raror and more costly precious stones, such as the diamond, ruly, emerald, and sapphire, are seldom treated by engraving, because, in addition to the excessive difficulty of working them by engravers' methods, their value principally depends on their brilliance of sparkle and colour. The stones of the generagraver are almost exclusively the variously coloured, mottled, and banded varieties of chalcedony quartz, which are differently named according to the appearance they present. From the gene engraver's point of view, the most important stones are carnelian, sard, chrysoprase, plasma, bloodstone, jasper, agate, and onys. As these names indicate only differences and onys. As these names indicate only differences of colonr and shades, degrees of translucency, and alternations of bands, all of which characteristics merge into each other, they are incapable of precise definition. The banded stone, generally called Onys (q.v.), is used as the principal material for comeo-engraving, the relief subject being worked in one coloured band or stratum on a ground of a different colour. different colour.

The art of genrengraving developed from the enstomary use of seals among the ancient Egyptians and other early civilised communities of the East. In addition to abundant remains of seals of high antiquity, we have ample testimony to their important functions from numerous references in early literature. Thus, in Genesis, xxxviii. 18, we read that Tamardemanded

of Judah his signet as a pledge; and Pharaoh, in investing Joseph with the office of principal minister, gave him his signet ring as a token of authority. The early scals of the Egyptians were cut in the form of the searabeens or sacred beetle, with the Fig. 1.—Carnelian Etruscan intaglio design engraved Scarabaus: Centaur and in a flat base; and in this form they were followed



Deer.

by the early Greeks and the Etruscans. Among the Chaldeans, Balylonians, and Assyrians the primitive seals took the form of cylinders, around GEM 127

which the intaglio device was engraved. An impression in soft clay or other medium was obtained from such seals by gently rolling the cylinder over the surface to be impressed. The earliest of such intaglios were cut in steatite, serpentine, and other comparatively soft stones; but these materials by degrees gave way to the harder and more enduring materials in which it was possible to sculpture fine details with great minuteness. The cylindrical signet of Darius I. of Persia, engraved in chalcedony, and preserved to the present day, is an example of the art at its highest development among the Asiatic momarchies.

From the nature of the subjects engraved on genns, and from the method in which they were mounted, it is evident that they soon came to be employed otherwise than as signets. Genns came to be worn as personal ornaments mounted in rings and in other settings, they were treasured as works of art, and they were treated as charms to arert evil and to win success and the favour of gods and men. For the breastplate of the Jewish high-priest, Moses was instructed to 'take two onyx stones, and grave on them the names of the children



Fig. 2.—Chalcedony Cylinder: Signet of Darins I.

of Israol. . . . With the work of an engraver on stone, like the engravings of a signet, shalt thou engrave the two stones' (Exodus, xvviii. 9-11). With the extension of the usos of gems, the forms of the stones also changed; in the case of cylinders lirst into comes engraved on the base, then into hemispherical stones, ultimately taking a flat thin form through which the light would pass sufficient to show the engraving by transmitted light; and with this view the stones were sometimes convex and ent rn cabochon. Ancient gems, like ancient coins, were generally irregular in outline, but at all times their prevailing form was oval.

The earlier engraved gems of the Greeks, as already mentioned, were in the form of searchs. In these the engraved intaglio was enclosed in a guilloche or engrailed border, and the engraving was stiff and formal, in every respect like Edmscan

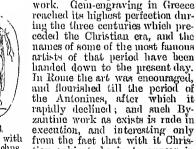




Fig. 3. Greek Sard, with Indian Bacchus.

Indian Bacohus. tian subjects hegin to appear in gens, Cameo-engraving was not practised till the days of imperial Rome.

practised till the days of imperial Rome.

The subjects of ancient geins embrace the whole circle of ancient art, and follow the laws of its development, animal forms being succeeded

by those of deities and subjects derived from the battles of Greeks and Amazons and Centaurs, the exploits of Herenles and other heroes; then by scenes from tragedians and later myths; and finally by portraits, historical representations, and allegoies. The inscriptions consist of the names of deities, heroes, and subjects; dedications to deities; the names of artists, sometimes in the genitive case, but often accompanied by the verb epoci, 'fecit;' addresses to individuals; gnomic or other sayings, indicating that the gens are amulets against demons, thieves, and various evils, or charms for pracuring love; the names of the possessors, and sometimes addresses, occasionally even disticles of poetry, and various motions. These inscriptions were often added by subsequent possessors, and are not of the age of the gem itself.

With the decline of the arts generally, the art of gem-engraving sank during the middle ages, to be awakened again only through the patronage of the Medici family in Italy in the 15th century, and with varying fortunes it continued to be practised till the early part of the 19th century. Strictly classical models, and to a large extent classical subjects, have been chosen by modern engravers, and towards the end of the 18th century the practice of foisting modern imitations on lunyers of gems as gennine treek works of the best periad became very prevalent. Prince Poniatowsky, who inherited a small collection of ancient gems from Stanislans, last king of Poland, employed the most skilful engravers of his day to fill up his eabluet with imitation antiques on which the names of the most eminent ongravers of antiquity were forged. The Poniatowsky forgeries did much to bring gem-engraving into disrepute, and to lower the value of even line and undoubted works. The diagnosis of gems has been rendered a work of extreme difficulty; and, as the modern imitator possesses conveniences for his task which were not at the disposal of the ancient artist, works of high artistic merit and great finish are more likely to be modern than ancient.

In modern times a considerable trade has been carried on in the preparation of artificial gens, both cances and intaglios, for jewelry purposes and for the cabinets of collectors. The most famons and successful maker of pastes was James Tassic, a native of Pollokshaws, near Glasgow, who in the latter half of the 18th century settled in London, and then, with marvellons industry, succeeded in copying apwards of 15,000 of the most famous and artistic genus of ancient and modern times. But Tassic's activity was not confined to the copying of gens alone. He produced in cameo a large series of portraits of his most famous contemporaries, and, while his whole productions are now highly prized, these large cameos are in great request, and command high and steadily-increasing prices.

Paste eopies of existing gens are made with comparative ease, by obtaining an impression from the original in very fine moist Tripoli earth or rotten-stone, which mould is carefully dried. A piece of glass of the required colour and size is then laid over the mould, and placed in a furnace, which is raised to a heat sufficient to melt the glass, cansing it to flow over and accurately fill the mould. When a cameo is being made, the raised portion alone is so moulded in opaque white glass, and, its back being ground flat and smooth, it is eemented to a mount of any desired colour. In some cases the mount itself is melted to the already formed relief portion, which for this purpose, after grinding away of the superfluons glass, is reintraduced into the furnace embedded in a Tripoli mould to allow of the mount being melted over it. Portrait cameos are made from wax models, easts

of which are taken in the same way as moulds are

obtained from gens.

For the making of imitation gens or precious stones (engraved or not) from glass specially pre-pared and coloured, as well as for the production of actual but artificial precious stones by chemical methods, see Stones (Precious), as also Diamond, Ruby, Pearl, &c. For seals, see Seal.

The chief implement used by the ancient engravers appears to have been made by splitting corundum into splints by a heavy lammer, and then fixing these points like glaziers diamonds into iron instruments, with which the work was executed by the hand (ferra retusa). The drill, executed by the land (ferra retusa). The drill, terebra, was also extensively used for hollowing out the deeper and larger parts of the work, and emery powder, the smarts or Naxian stone, for polishing. The so-called wheel, a minute disc of copper, secured to the end of a spindle, and moistened with emery powder or diamond dust, and driven by a lathe, does not appear to have come into use till the Byzantine epoch. It has been conjectured that the artist used lenses of some kind, or globes filled with water, to execute his minute work; but the ancient, like the modern engraver, rather felt than saw his way. All these processes were not employed by the same artist, for, hesides the engraver (scalptor cararius, dactylioglyphus), there was a polisher (politor), not to mention arrangers (compositores genmarum), and mention arrangers (compositores gemmarum), and merchants (genemarii, mangones genemarum) who drave a flourishing trade in emeralds and pearls and engraved stones in the days of Horace.

The principal writers of antiquity who treated of gens are Onomacritus or the Pseudo-Orpheus, Dionysius Pericgetes, Theophrastus, and Pliny, whose chapter is compiled from antecedent Greek and Roman authors. Isidorus, 630 A.D., gives an account of the principal stones; so do Psellus and

Marbodus in the 11th century.

Marbodus in the 11th century.

See Mariette, Phyres Gravées (Paris, 1750); Raspe, Descriptive Catalogue of Engraved Gems (Lond. 1791); Millin, Introduction à l'Étude des Pierres Gravées (Paris, 1797); Kranse, Pyryoteles (Halle, 1856); King, Antique Gems and Rings (3d ed. 2 vols. 1872), and Huadbook of Enyraved Gems (2d ed. 1885); Bucher, Gesch. der technischen Kuhste (1875); Billings, Science of Gems, &c. (Lond. 1875); Pannier, Les Lapidaires Français du Moyen Age (Paris, 1872); Jones, History and Minstery of Precious Stones (1880); Gatty, Catalogue of the Engraved Gems in the Collection of J. Mayer (1879); Cutalogue of the Engraved Gems in the British Museum (Lond. 1889).

Gemara. See TALMUD.

Gemini ('the Twins'), the third constellation in the zodiac. See CASTOR AND POLLUX.

Gemistus, See Pletho.

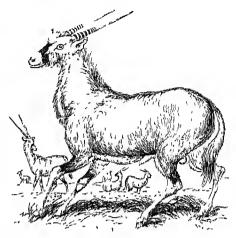
Gemmation. See Reproduction.

Gemmi Pass, a narrow path, nearly 2 miles long, which crosses the Alps at a height of 7553 feet, and connects the Swiss cantons of Bern and Valois.

Gemot. See FOLKMOOT, VILLAGE COMMUNI-TIES, WITENAGEMOTE

Gems-bok (Oryx Gazella), a species of antelope, described by some naturalists as the Oryx, but which, being a native of South Africa only, cannot be the Oryx of the ancients, although it is certainly a nearly allied species. It is a heavy, stout animal, about the size of a stag, with rough reversed hair on the neck and along the ridge of the back blave pointed easy: and almost perfectly the back; large pointed ears; and almost perfectly straight horns, fully two feet long, in the plane of the forehead, little diverging, and obscurely ringed at the lare. The colours are harshly contrasted, dark rusty gray above, and white on the under parts, separated by a broad dark-brown or black band;

the head white, with black transverse bands; the thighs black, and the legs white. The hoofs are



Gems-bok.

remarkably long, adapted to the rocky mountainous districts which the animal frequents. The Gems-bak makes such use of its hours as some times even to beat oil the lion. It inhabits dis-tricts free from wood, and is generally found in pairs or in very small herds.

Genazzano, a small fown of 4008 inhabitants, 27 miles E of Rome, containing an old eastle of the Coloma family, and the far-famed pilgrimage chapel of the Madonna del Inon Consiglio. See The Virgin Mother of Good Counsel, by Dr G. If. Dillon (1885).

Gendarmes (Fr., 'men-at-arms') were originally mounted huncers, armed at all points, and attended by five inferior soldiers, who were furnished by the holders of ficis; these were replaced by Charles VII.'s compagnies d'ordonnauce, which were dissolved in 1787, one company of gendarmeric being retained as the badygnard of Louis XVI. Since the Revolution, except for a short interval at the Restoration, the gendarmes have constituted a military police, which superseded the old maréchaussée, and comprises both eavalry and infantry; divided into legions and companies, and these latter into brigades, the organisation of the force corresponds to the territorial divisions of the army. The men receive much higher pay than the rest of the army, of which, however, the corps is a part, its members being drafted from the line for this service. Germany also since 1808 has had its gendarmen. See Police.

Gender, a grammatical distinction between words corresponding directly or metaphorically to the natural distinction of sex. Names applied to the male sex are said to be of the masculine gender; those applied to the female sex, feminine; while words that are neither masculine nor feminine are said to be neuter or of neither gender. In modern English we have no such thing as morely grammatical gender, save when sex is implied metaphorically to inanimate things (a ship, a steamphorically to have no fivered to represent the same are the sex of phoreany to manimize things (a sinp, a steam-engine, &c.) by such a figure of speech as per-sonification; but in Old English, as well as in Sanskit, Greek, and Latin, the greater part of inanimate things are either masculine or femiuine, the others being nenter; and this distinction of gender is marked by the terminations of the nom-inative and other case-endings. Grammatical gender went gradually out of use after the Norman

Conquest, the northern dialects being the earliest to discard it. In Hebrew there is no nenter, all names being either masculine or feminine, as also in the modern Romance tongues, Italian, French, Spanish, and Portuguese. German, again, in this particular resembles Old English and the classical tongues. See Grammar.

Genealogy. See PEDIGREE.

General, or General Officer, is an officer of the general staff of the army. A field-marshal or general commanding-in-chief would in the field usually command several Army Corps (q.v.), a general one corps, a lieutenant-general one Division (q.v.), a major-general one Brigade (q.v.). Brigadier-generals in the British army are usually colouels in temporary command of brigades.

There colonels in temporary command of brigades. There are many in India. In 1889 there were 5 field-marshals in the British army, 13 generals, 43 lientenant-generals, and 117 major-generals. Comparatively few of these hold commands, and if unemployed for five years in either rank they are compulsorily retired. Also, a major-general must retire if he reaches sixty-two without being monoided, and a liontenant-general or general at promoted, and a liontenant-general or general at sixty-seven. Promotion amongst the generals is sixty-seven. Promotion amongst the generals is by seniority, unless there are good grounds for a contrary course, but promotion to field-marshal is made by the sovereign without respect to seniority. Colonels, if under lifty-five (sixty-twe if holding temporary rank as major-general), and stated to he competent by the commander-in-chief, are eligible for promotion to general's rank, and the seniors are usually taken to fill vacancies as they come that it is a section. occur; but at any time a colonel may be promoted for distinguished conduct.

As regards pay, when actively employed a general commanding-in-chief receives £10, 15s. a general commanding-in-ciner receives £10, 15s, a day; a general not in chief command, £8; a lientenant-general, £5, 10s.; a major-general, £3; and a brigadier-general, £2, 10s., all exclusive of allowances for forage, &c. When on half-pay a field-marshal receives £1300 a year, the others £800, £650, and £500 respectively. When retired a general receives £1000 a year, a lientenant-general £850, and a major-general £700; but there are various prodifications offecting these amounts

modifications affecting these amounts.

The rank of captum general, superior even to field-marshal, is held by the sovereign ex office, and is borne by the colonel of the Honouvalle Artillery Company of London, but otherwise it has not been conferred upon any officer of the British army during

the 19th century.

In the United States the rank of general, a higher rank than had before existed, was created Grant. It was subsequently conferred on Sherman and on Sheridan. The highest rank held by Washington was that of lientenant-general, which is also usually that of the general-in-chief of the army. also usually that of the general-in-chief of the army. There is, of course, but one lieutenant-general; and by law there can be but three major-generals and six brigadier-generals. The general's yearly pay is \$13,500; the lieutenant-general's is \$11,000; the major-general's, \$7500; the brigadier-general's, \$5500. In the militia there are ranks with like names, and the title of general as a form of address is consequently of embarrassing frequency in the United States in the United States.

General, in the Roman Catholie Church, the supreme head, under the pope, of the aggregated communities throughout Christendom belonging to a religious order (though the abbas abbatum of the Benedictines is not actually styled 'general'). The governing authorities of the monastic orders in the Roman Catholic Clurch may be arranged in three classes: (1) the superiors of individual convents or communities,

called in different orders by the various names of abbot, prior, rector, guardian, &c.; (2) the provincials, who have authority over all the convents of a 'province'—the provinces being usually coincident in limit with kingdoms; (3) the general, to whom not only each member of the order, but all whom not only each member of the order, but an the various officials of every rank are absolutely subject. The general is usually elected, commonly by the general chapter of the order, which, in the majority of orders, consists properly of the provincials; with these, however, are generally associated the heads of the more important monasteries, and the conserver of contain subdivisions of more as also the superiors of certain subdivisions of pro-vinces. The office of general in most orders is held for three years. In that of the Jesnits it is for life; but in all the election of the general chapter must be confirmed by the pope. In most orders, too, there is assigned to the general a consultor (admonitor) and the property of the poperty of tor) or associate (socius), who, however, is only entitled to advise, and has no authority to control the superior. The general also is supposed to consult with and to receive reports from the various local superiors. He sends, if necessary, a visitor to inquire into particular abuses, or to report upon such controversies as may arise, and he holds a general chapter of the order at stated times, which general chapter of the order at stated times, which differ according to the usage of the several orders. The general is exempt from episcopal jurisdiction, being subject to the immediate jurisdiction of the pope himself. He resides in Rome, where he enjoys certain privileges, the most important of which is the right to sit and vote with the bishops in a general council of the church. See MONACHISM, and the articles on the several orders.

General Assembly. See Assembly, GENERAL.

Generalisation is the act of comprehending under a general name a number of objects which agree in one or more points. These points are specially attended to by the process of Abstraction (q.v.), and are indicated by the common name. The result of generalisation is a common name or general term, which stands for the many objects in so far only as they all agree. This process is closely akin to classification and to definition; and the higher kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the lighter kind of generalisation is a large to the l and the higher kind of goneralisation is Induction

(q.v.). In legic the genus is a higher class which includes a lower, the lower one being the Species (q.v.); but the distinction is relative. That which is a genus in relation to its species is itself a species in regard to a higher genus. The genus has the larger Extension (q.v.), the species the larger intension. For the great question as to whether the genera and species have a real existence, see NOMINALISM. For genns in natural history, see

Generation, a single succession in natural descent, the children of the same parents; in years three generations are accounted to make a

Generation, Spontaneous. See Spontane-OUS GENERATION.

Generations, ALTERNATION OF, an interesting complication in the life history of many plants ing complication in the life-history of many plants and animals, the organism producing offspring which are unlike itself, but which in turn give rise to forms like the original parents. Thus, a zoophyte buds off a swimming-bell, and the fertilised ova of the latter develop into the former. Early in the century the poet Chamisso, accompanying Kotzebne on his circumnavigation of the globe, called attention for the first time to the fact of alternation as observed in one of the loconotor tunicates (Salpa); the progress of marine zoology and the study of parasitie worms gave many naturaland the study of parasitie worms gave many naturalists glimpses of other alternations; but Steenstrup was the first to generalise the results in his work published in 1842, entitled 'On the Alternation of Generations; or the propagation and development of animals through alternate generations, a peenliar form of fostering the young in the lower classes of animals.' From hydroids and finkes he gave illustrations of the 'natural phenomena of an animal producing an offspring which at no time resembles its parent, but which itself brings forth a progeny its parent, but which itself brings forth a progeny that returns in its form and nature to the parent,' and distinguished the interpolated generation as the Amme, or 'wet-mrse.' His essay was steinly criticised by Owen in 1849, while Lenckart attempted to treat all the alternations as eases of metamorphosis. Criticism, however, has only rendered Steenstrup's generalisation more precise, and the observations of some of the foremost naturalists have shown that the phenomena are of wider occurrence than was at first supposed, though the occurrence than was at first supposed, though the form of the alternation varies widely in the different

(a) The Rhythm between Sexual and Asexual Reproduction.—The simplest case to start with is that of many hydroids where a sessile, plant-like zoo-phyte—a colony of numerous nutritive 'persons'— produces in the summer months modified reproductive individuals which are set adrift as medusoids. These become sexual, and their fertilised ova develop into embryos which settle dawn and give rise to the sessile zoophy te from which wo started. The life history may be written in the formula:

$$\frac{M}{F} - A - \frac{M}{F} - A - \frac{M}{F}$$

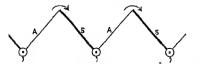
(where M and F stand for male and female, and A for asexnal generation).
The life history of the common jelly-fish (Aurelia)

(fig. 1) illustrates a similar contrast. From the



Fig. 1.—Life-history of the common Jelly-fish: 1, free-swimming embryo (planula); 2-6, the embryo fixed developing into a 'hydra-tuba,' which (7-8) divides transversely into a pile of individuals; these in turn (9) are liberated and grow (10-11) into jelly-fish. (From Haeckel.)

large free-swimming sexual jelly-fish embryos are produced which develop not into jelly-fish again, but into sessile tubular organisms or 'hydra-tubæ.'

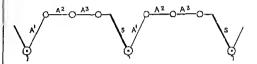


A, asexnal, produces S, sexual, from fertilised ovum of which A again arises.

From these, by growth and division in an entirely asexual fashion, the jelly-fish are in turn repro-

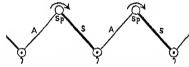
dneed. Here the sexual generation is the more stable and conspicuous—the reverse of the former case, but the same formula applies, or the preceding graphic notation. In the free-swimming Tunicata (Salpa and Doliolum) the alternation is somewhat more complex, but in no essential respect different.

(b) Alternation between Sexual and Degenerate Sexual Reproduction.—The life history of the common liver fluke, sketched in the article Fluke, is in most cases as follows: From the fertilised ovnm of the fluke an embryo develops, which produces several asexual generations, the last of which grow up to become sexual flukes. Now the asexual generations are not products of division or budding, but arise from what, though not ova, may be called precocions reproductive cells; in fact, they arise by a degenerate process of parthenogenetic reproduc-tion in early life. The facts may be thus expressed:



where A2 and A3 represent two of the interpolated

asexual generations.
This alternation between sexual reproduction by fertilised ova and reproduction by means of by fertilised ova and reproduction by means of special cells which require no fertilisation prevails in many plants—e.g. ferns and mosses. From a fertilised egg-cell arises the ordinary fern-plant with which all are familiar. This, however, produces no male or female elements, but simply 'spores,' which are able of themselves (when they fall to the ground) to develop a new organism—the inconspicuous but sexual 'prothallus.' This bears male or female organs or both, and from the fertilised egg-cell thus produced the conspicuous vegetative, sexless fern-plant once more arises. The facts may be again expressed in notation: notation:



A, the vegetative sexless fern-plant produces a spore (sp.) from which the sexual 'prothedius,' 8, arises, giving origin to fertilised egg-cells, and thereby recommencing the cycle.

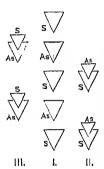
The same formula will apply to the moss. The familiar moss-plant bears male and female reproductive organs. From a fertilised egg-cell so productive organs. duced a sexless spore-producing generation at once develops, and grows like a parasite on the apex of the moss-plant. The spores fall to the ground, and grow out into threads ('protonema'), from which there is finally budded the moss-plant with which we started.

Besides the above alternations there are other rhythms, some more complex, others much less frequent, into which we cannot here enter. In some eases the life-history of the liver-fluke, by the division of the embryo (sporocyst), combines the alternations (a) and (b); in some midge larve juvenile parthenogenesis alternates with the adult sexual process; in not a few eases, as in aphides, the rhythm is between parthenogenesis and normal sexual reproduction; while finally there is an alternation of two different sexual generations in three thread-worms or nematodes.

Occurrence.—Alternation of generations is hinted

at in the colonial Radiolarians, is definitely seen in the fresh-water sponge, is very characteristic of the Colenterates, prevails with curious complications in the flukes, is doubtful in tapeworms, occurs in one form in a few Nematodes and in certain Chatopods (Syllids), is represented by the rhythm between parthenogenesis and sexual reproduction in crustaceans and insects, and is very emphatic where it was first observed—in the locomotor tunicates.

In the lower plants, algae and fungi, an alterna-tion between spore-producing



I. expresses ordinary alternation between sexual (8) and asexual (As) generations; in II, the asexual is increasingly subordinated to the sexual (as in moses); in III, the sexual is sub-ordinated to the asexual (as in flowering plants).

and truly sexual generations is frequent. In mosses and ferns it is almost constant, and yet more marked. Occasionally spore-formation or sex-cell formation may be suppressed, and the history thus simplified. lifethe flowering plants what corresponds to the sexual generation of a fern is much reduced; it has come to remain continuous with the vegetative asexnal generation, on which it has had a subtle physiological reaction.

Hints as to Rationale.—

Hints as to Rationale.—
The origin and import of the above rhythms, and their relation to the theory of heredity, are difficult prob-lems. To some extent, however, it is easy to recognise that some of the alterna-

tions only express with emphasis the fundamental organic antithesis between nutrition and reproduction. A fixed hydroid -passive and well nourished, is prependeratingly vegetative and asexual; the reverse habit, the physiological rebound, finds expression in the physiological rebonno, index expression in the actively locomotor sexual swimming-bell or medusoid. In the same way, though the alternation is less strictly between asexual and sexual, the contrast between the deeply-rooted, leafy, spore-bearing fern-plant and the inconspicuous, weakly-rooted, slightly-exposed, sexual prothallus is again fundamental alternation of conventions in mentally parallel. Alternation of generations is in fact an emphasised rhythm between the anabolic and katabolic tendencies so fundamental in the individual and racial life. To this, however, it will be necessary to return in the article REPRO-DUCTION.

See Steenstrap, 'On the Alternation of Generations' (Eng. trans. Ray Society, 1845); Owen's Parthenogenesis (1849); Haeckel's Generelle Morphologic (Berlin, 1866); Geddes and Thomson, The Evolution of Sex (Lond.

Genesee, a remarkable river rising in Pennsylvania, and flowing nearly 200 miles north through western New York into Lake Ontario, 7 miles N. of Rochester. The Genesee is famous for its of Rochester. The Genesee is famous for its extraordinary falls. Three of these occur within a distance of 1½ mile; two are respectively 68 and 90 feet high, and the Portage Falls are 110 feet high. The river has also a sheer fall of 95 feet at Rochester, utilised for water-power; and another easeade, a few miles below, is almost as high.

Genesis (Gr., 'origin,' 'generation'), the name given by the Septuagint to the opening book of the Pentateuch. In the Hebrew Bible it is named, from its first word, Bercshith (in the beginning' Critics are agreed that the book, like the rest of the Pentateuch, is a mosaic, drawn from various sources. A general description of these is already given in the section on the Law and Historical Books in the article BIBLE.

In Genesis the historical thread of the Priestly Code runs parallel to that of the Jehovistic element, which, in the view now prevailing, is the earlier of which, in the view now hevering, is the earner of the two. The Priestly Code opens the book with its account of the creation of the world (i. 1—ii. 4a), which is immediately followed by the Jehovistic account (ii. 4b—iii. 24). After these are given, both in the Priestly narrative and the Jehovistic, the transition from Adam to Noah (iv. v.), the flood (vi.-ix.), and the transition from Noah to Abraham (x. xi.). In Genesis the Priestly narrative is a summary of facts mainly subordinated to the development of the theoracy. The history is broken into sections, each heginning with the words, 'these are the generations of,' &c. (cf. v. 1; vi. 9; x. 1; The whole is divided into three periods, each introduced by a covenant—(1) with Adam (i. 28—ii. 4); (2) with Noah (ix. 1-17); and (3) with Abraham (xvii.). Each covenant has its sign: the first has (xyii.). Each covenant has its sign: the first has the Sabbath (ii. 3), the second the rainbow (ix. 12), the third circumcision (xvii. 10). These three periods and covenants lead up to the fourth period and covenant—viz. the Mosaic. The writer proceeds in an orderly and circumstantial manner, giving much attention to chronology, and, for the sake of clearness, sometimes repeating details more sake of clearness, sometimes repeating details more in the style of a lawyer than a historian (cf. vii. 13-16; viii. 15-19; xxiii. 17, 18, 20). The name for God used by him in Genesis is Elohim or El Shaddai (see Ex. vi. 3). The promises are by him confined to Israel, and have no reference to salvation through Israel for Gentiles (cf. xvii. 6-8; xxviii. 3, 4; xxv. 11, 12).

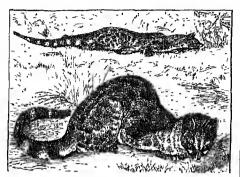
The 'skeleton of ethnographic genealogy' which, in both narratives, is the foundation of the patriavallal history, is in the Jalvanitia (several with

archal history, is in the Jehovistic 'covered with flesh and blood.' Here the characters are living men, and their passions and actions are traced with the deep moral and religious inspiration and the marvellons epic vividness and force which give their imperishable charm to the stories of Genesis. And it is the prophetical narrative that shows how the Divine purpose included from the beginning a remedy for the world's sin (iii. 15), reveals the long-suffering mercy of the Divine mind (cf. viii. 21, 22; xviii. 23 ct seg.), and prophesies that 'in Abraham's seed shall all the nations of the earth be blessed' (xii. 3; xviii. 18; xxviii. 14). For the distinction made between different parts of the prophetical narrative (less obvious than that between the prophetical narrative itself and the Priestly Code), see PENTATEUCH. How the conclusions of science have affected the literal faith in the descriptions of creation given in Genesis is shown in the article CREATION, and in Riehm, Der biblische Schöpfungsbericht (Halle, 1881).

See the Commentaries by Luther, Calvin, Rosenmüller (1821), Kinnchi (edited by Ginsburg, 1842), Kalisch (Lond, 1858), Wright (ib. 1859), Cook and others (ib. 1871), Tuck (2d ed. by Arnold & Merx, 1871), Reus, F. Delitzsch (4th ed. Leip. 1872), Lange (2d ed. 1877, Keil (3d ed. 1878), Dillmann (4th ed. 1882), and Dods (Edin. 1882), See also Knobel, Die Völkertaft der Genesis (Giossen, 1850); Wellhausen, Prolegomena (Eng. trans. 1885); and Driver's Notes on Lessons from the Pentateuch (New York, 1887).

Genette, or Genet (Genetta), usually regarded as a separate genns of carnivorous maninals, but by some included in the genus Civet (q.v.). The genettes differ from the civets in their smaller size, the vertically slit pupil, the completely re-tractible claws, the smallness of the anal pouch, and the faintness of the characteristic odon. six species of genetic, five are found only in Africa; the common genette is found also in the south of

Europe and Syria. Its fur is gray with black or brown spots, and it is the only viverrine animal



Common Genette (Genetta vulgaris).

found in Europe. Genettes may be trained to catch mice like cats.

Geneva, a cauton in the south-west of Switzer-land, is bounded N. by the canton of Vaud and the Lake of Geneva, and S., E., and W. by the territories of France. It has an area of 108 sq. m., and in 1880 had a pop. of 101,595, of whom 51,560 were Catholics, whilst 85 per cent. spoke French as their mother-tongue. It is watered by the Rhone and the Arve, which unite about 2 miles from the south-west extremity of the Lake of Geneva. The surface is hilly, chief eminences being the steep Salève (4528 feet) and the Reculet (5631); but the soil, which is not naturally fertile, has been rendered so by the industry of the inhabitants. According to the constitution of 1847, since amended, all male citizens of twenty years of age exercise the right of electing representatives to the cantonal council, the supreme legislative body, the age of members of which must be at least twenty-five years. There is a representative for every 1000 inhabitants. The executive is confided to a council of state composed of seven members, nominated for two years by universal suffrage. The constitution gnarantees civil and religious liberty, all forms of worship being allowed by law; but the national church is the Reformed Calvinistic. Primary elucation is compulsory, but free. The chief branches of industry are gardening, vine and fruit growing, and the manufacture of articles of bijoutere and watches. In the two last-named branches the annual production is valued at nearly one utilion pounds sterling. Musical-boxes, chronometers, mathematical instruments, with pottery, &c., are also made. The chief town is Geneva.

Geneva (Fr. Genève, Ger. Genf, Ital. Ginewra), capital of the Swiss canton of the same name, is situated at the exit of the Rhone from the Lake of Geneva, 388 miles by rail SE. of Paris. A Gallic town originally, Geneva acknowledged Roman supremacy in 120 E.C. It was a place of some importance under the Burgundian kings, from whom it passed in 534 to the Franks, and from them towards the end of the 9th century to the new kingdom of Burgundy. It had been made a bishop's seat in the 4th century. From the 12th century a continual feud existed between the bishops and the supremacy—a state of things which the citizens took advantage of to obtain a considerable share of municipal liberty for themselves. Having secured Freiburg (1519) and Bern (1526) for allies, the republic of Geneva finally won its complete independence from Savoy. The acceptance of Protestantism by the republic a few years later

brought to an end its alliance with the Roman Catholic republic of Freiburg, and exposed it to fresh attacks from the House of Savoy; and it was only saved by the timely intervention of its stannel ally Bern (1536). In the summer of that same year Calvin (q.v.) arrived at Geneva, and began his reconstitution of the political and social life of the city, which created it one of the chief strongholds of Protestantism in Europe. In 1602 the last attempt of the Dukes of Savoy to recover the town was frustrated by the citizons. During the 18th century Geneva was distracted by unceasing fends between the anistocratic and popular parties, until in 1782 Bern, Sardinia, and, in particular, France interfered in favour of the aristocracy. The French Revolution led to a new crisis: the government was overthrown in July 1794, equality in the eye of the law was established, a national convention appointed, and a reign of terror commenced. In 1798 Geneva and its territory were annexed to France; but, after the overthrow of Napoleon, they recovered their independence and joined as twenty-second canton the Swiss Confederation under the sanction of the treaties of Vienna and of Paris (1815). The aristocratic party managed to repossess themselves of the government of the city, and their rule was only superseded by a more democratic constitution after much agitation and several risings of the people between 1842 and 1846, in which the leading spirit was Fazy (q.v.). After 1870 the town was for some years kept in a state of unrest owing to the attempt of the Ultramontances to revive the Roman Catholic bishopic of Geneva.

Formerly Geneva was surrounded by walls, and consisted of clusters of narrow and ill-drained streets; but since the accession of the radical party to power in 1847 the town has been almost entirely rebuilt in modern style. The ancient ramparts have been removed, streets widened and well paved, new and commodious gnays constructed along the shores of the lake and river, and various improvements introduced, chief amongst which is the erection of a breakwater, within which steamboats are received and lie in safety. In its course through the town the Rhone forms two islands, on one of which still exists an antique and picturesque cluster of buildings; on the other, laid out as a public pleasure-ground, is a statue of Rousseau. In the Place des Alpes is a sumptious monument to Duke Charles XI. of Brunswick, who, dying here in 1873, left 16,500,000 franes to the city. Famons as a theological, literary, and scientific centre, Geneva has given birth to Rousseau; to the physicist De Saussure; to the naturalists Charles Bonnet and Pictet; to Necker, the French minister of finance, and father of Madame de Staël; to the humorist Toepffer; and to the sculptor Pradier. The principal edifices are the Transition cathedral of St Peter, which dates from 1124; the town-hall, within which the members of the Alabama (q.v.) arbitration met in 1872; the academy, founded by Calvin in 1559, with a library of 110,000 volumes, and in 1873 converted into a university (with about 600 students); the magnificent theatre, opened in 1879, which ranks ext in size to the Paris Opéra and the Court-theatre of Vienna; the Rath Museum (1824-26); the Fol Museum, with collections of Greek, Roman, and Etruscan antiquities; the Athencum, devoted to the fine arts; and the museum of natural history, containing De Saussure's geological collection, admirable collections of fossil plants, &c. The stape manufactures of the town are watclees, musical-hoxes, and jewelry. Pop. (1885) 51,637 (with the suburbs Plainpalais and Eaux Vives, 74,453); (1888) 52,457. Se

The Geneva Convention (1864), signed by twelve delegates from various countries, mainly regards the succour of the wounded in time of war, and forbids cruel methods of warfare (e.g. the use of explosive bullets). The resulting international code was ultimately adopted by all civilised powers except the United States; and a 'Red Cross Society' was established, which became very prominent and helpful during the Franco-German war (1870-71), its llag, with the 'Geneva Cross,' being recognised as neutral. Other international conferences for promoting the same objects were held at Paris (1867) and Berlin (1869). For the Geneva Bible, see BIBLE.

Geneva, a town of New York, at the north end of Seneca Lake, 26 miles W. of Anburn by rail, with flouring-mills and manufactures of engines, boilers, &c. It is the seat of Hobart College (Episeopal, founded in 1824). Pop. (1880) 5878.

Geneva, Lake of, or Lake Leman (Lawns Lemanus), situated between Switzerland, to which the larger portion belongs, and France. It lies 1218 feet above the level of the sea, and extends for 45 miles from east to west, in the form of a crescent. Its greatest breadth is 9 miles, its area 223 sq. m., and its maximum depth is 1092 feet. This lake at some periods of the year presents a curious phenomenon: the whole mass of water oscillates from side to side of the lake, causing, especially near Geneva, a rise and fall of from two to five feet in the course of about eight or ten minutes (scicha). The phenomenon is probably due to differences of barometric pressure on different parts of the surface. The lake abounds in fish. The shone on the side of the Pays de Vand is a classic spot, celebrated by J. J. Rousseau in his Nouvelle Hélouse and by Byron in his Childe Harold and in the Prisoner of Chillon, while the names of Voltaire and of Madame de Staël are connected with Ferney and Coppet at the Geneva extremity, Gibbou's with Lausaune. The southern Fronch shore rises solemn and stern, with the mountains of Savoy in the background. From the Lako of Geneva, Mont Blane is visible, and although 60 miles distant, is often reflected in its waters. Mirages are sometimes observed on the lake. The Rhone enters the lake at the upper end, turbid and yellow, and leaves it at the town of Geneva as clear as glass, and of a deep blue tint. The lake receives about twenty unimportant streams along its northern shore.

Geneviève, the patron suint of Paris, was born about 424, in the village of Nanterre, near Paris, and took the veil in her lifteenth year. On the death of her parents she removed to Paris. She acquired an extraordinary reputation for sanctity, which was increased by her confident assurance that Attila and his Huns would not touch Paris, and by an expedition undertaken for the relief of the starving city during the Frankish invasion under Childeric, in which she journeyed from town to town, and returned with twelve ship-loads of provisions. In 460 she built a clurrel over the tomb of St Denis (q.v.), where she was buried at her death in 512. See her Life by Saint-Yves (1845) and Lefeuve (new ed. 1861).

Genghis Khan, originally called Tennijn, a celebrated Mongol conqueror, was born in 1162 at Deligun Bulduk on the river Onon (SE of Lake Baikal), the son of a Mongol chief whose sway extended over great part of the region between the Amur and the Great Wall of China. Being called upon to rule his father's people when only thirteen years of age, Tennijin had to struggle hard for several years, first against a confederacy of revolted tribes, then against different confederacies of hostile tribes and neighbouring rivals, whom his

nninterrupted successes and rapidly-growing power had made jealons. The most critical period of his career at this juncture occurred during a war with Wang Khan, the powerful chief of the Keraits. Tennijin, at first worsted, was compelled to retire to a desert region with only a few warriors; but in the following year (1203) he collected another army, and with it inflicted upon his enemy a crushing and decisive defeat. The Keraits thereupon becume subject to Tennijin. His ambition awakening with his continued success, the Mongol prince spent the next six years in subjugating the Naimans, a powerful Turkish confederacy who occupied the region between Lake Balkhash and the river Irtish; in conquering Hia or Tangut, a Chinese empire lying between the Desert of Gobi and Chaidam; and in assimilating the results of the voluntary submission of the Turkish Uigurs, from whom the Mongols derived the beginnings of their civilisation, as their alphabet and laws. It was during this period—viz. in 1206, that he adopted the title of Jenghiz or Genghis Khan, equivalent to 'Very Mighty Ruler.'

Mighty Ruler.'

Bot upon yet more ambitious schemes, he in 1211 refused tribute to the Kin emperor of North China, and invaded and overran his country in several eampaigns. About this same time, too, his attention was directed to the west: with comparatively little trouble he defeated the ruler of the Kara-Chitai empire, and annexed (1217) his country, which extended from Lake Balkhash to Tibet. His next undertaking was the most formidable of all, an attack upon the powerful empire of Kharezm, whose confines ran conterminous with the Jaxartes (Sihūn or Sir-Daria), Ferghana, the Indus, Persian Gulf, Kurdistan, Georgia, and the Caspian Sea. Entering this extensive country with three armies in 1218, the Mongol prince and his captains successively took, often by storm, the populous cities of Otrar, Sighnak, Aksi Khojend, Bokhara, and Sanarcand, hunted down from one end of his territories to the other Mohammed, the ruler of Kharezm, and the princes of his family, captured Urgenj or Kharezm (now Khiva), devastated with most horrible cruelties and barbarities the beautiful and prosperous province of Khorasan and its cities (Nessa, Merv, Nishapur, and Herat), chased Jelal-ud-Din, son and heir of Mohammed, across the Indus into Iudia, and finally returned home in 1225 by the way they had come. Two of Genghis' lientenants, Chépé and Subutai, who had so relentlessly and pertinaciously hunted down Mohammed, passed on from the southern shore of the Caspian northwards through Azerbijan and Georgia, then, turning to the west, they traversed southern Russia and penetrated to the Crimea, everywhere routing and slaying, and finally returned by way of Great Bulgaria and the Volga, beyond the northern end of the Caspian—a marvellous military raid. Meanwhile in the far east Mukuli, one of the most capable amongst the group of the great conqueror's clover generals, had completed the conquest of all northern China (1217–23) except Honan.

Genghis did not long stay quietly at home. After but a few months' rest he again took to the saddle, to go and chastise the king of Hia or Tangut, who had refused him obedience. But this was his last expedition, for, after thoroughly subduing the country, Genghis died of sickness, on 18th August 1227, amongst the northern offshoots of the Kuen-Lun called the Mountains of Liupan. The rapidity and magnitude of his conquests seem to have been as much due to the admirable discipline and organisation of his armies as to the methods in which he conducted his campaigns. His troops were all horsemen, hardy, abstemions, inured to fatigue, indifferent to weather, accus-

tomed to go days and nights in the saddle without resting. Thus the Mongol armies could inove with extreme celerity, and needed little provisioning. They never left either enemy or strong town behind their backs to threaten their communications: all the former were ruthlessly slain or massacred, all the latter completely razed to the ground. The hard labour necessary in besieging the fortified cities was done by the peasantry the tortified cities was done by the peasantry of the country in which they were situated, and in the battles the same wretched people were frequently placed by the Mongols in the forefront of the light to bear the brunt of their enemies' onset. Genghis was, however, something more than a warrior and conqueror; he was also a skilful administrator and ruler: he not only expoured countries threshing from the Black Sea conquered empires stretching from the Black Sca to the Pacific, but he organised them into states which endured beyond the short span that usually measures the life of Asiatic sovereignties.

See Howorth, History of the Mongols, part 1 (1876); R. K. Douglas, Life of Jenghiz Khan (1877); and compare Erdmann, Tennudschin, der Unerschutterliche (1862), and D'Ohsson, Histoire des Mongoles (1852).

Genii, among the ancient Romans, were protecting spirits, who were supposed to accompany overy created thing from its origin to its final decay, like a second spiritual self. They belonged not only to men, but to all things animate and inanimate, and more especially to places, and were regarded as effluences of the Divinity, and worshipped with divine honours. Not only had every shipped with divine honours. Not only had every individual his genius, but likewiso the whole people. The statue of the national genius was placed in the vicinity of the Roman forum, and is often seen on the coins of Hadrian and Trajan. The genius of an individual was represented by the Romans as a figure in a toga, having the head veiled, and the cornucopia or patera in the hands; while local genii appear under the figure of serpents eating fruit set before them. Onite different are the genii whose Arabic name, Djinn or Jinn, was tanslated by the Latin term genius, for want of a better word, or from the casual similarity of the sounds. See Demonotory and Familiar sounds. See DEMONOLOGY, and FAMILIAR.

Genipap, Genipa americana (Cinchonaceæ), a large thee of the West Indies and warm parts of South America, with excellent fruit. The pearlgray timber is occasionally used by joiners.

gray amoer is occasionally used by joiners.

Genista (Celtic gen, 'a shrub'), a legiminous genus ahready mentioned under Broom (see also Greenweed). G. anglica, a small, much branched, very spiny shrub of poor soils, is called Petty Whin and Needle Furze in England. The Genista of Virgil and other Roman classics is supposed to be G. hispanica, of southern Europe, with branched stiff spines. The name Plantagenet is from Planta Genista; but what plant was intended, and whether the common broom, furze, or a species of Genista. the common broom, furze, or a species of Genista is not so certain. See PLANTAGENET.

Genitive. See Grammar.

Genlis, Stéphanie Félicité Ducrest de St Aubin, Comtesse de, was born at Champcéri, near Autun, in Burgundy, 25th January 1746. At the age of sixteen she was married to the Comte de Genlis, and in 1770 was made lady in waiting to the Duchesse de Chartres. In 1782 the Duc de Chartres, afterwards known as Egalité, appointed her 'governor' of his children, including Louis-Philippe. Madame de Genlis wrote a variety of Philippe. Aladame de Genius wrote a variety or works for her pupils, among others Thédire d'Éducation (1779-80), a collection of short comedies; Annales de la Vertu (1781); Adèle et Théodore, ou Lettres sur l'Éducation (1782); and Les Veillées du Château (1784). On the breaking out of the Revolution Madama de Caplis took the liberal side volution Madame de Genlis took the liberal side, but was ultimately compelled to seek refuge (1793)

in Switzerland and Germany. When Bonaparte became consul she returned (1799) to Paris, and received from him a pension. She died at Paris, 31st December 1830. Madame de Genlis's writings amount to about nincty volumes. Amongst them may be mentioned the romance Mellic. de Clermont (1802), Mémoires Inédits sur le XVIII. Siècle et la Révolution Française (10 vols. 1825), and Diners du Baron d'Holbach. The last contains a great deal of curious but malicious information concernient the freathinkers of the 1824 contains. ing the freethinkers of the 18th century. Bonhomme's Mmc. de Genlis (Paris, 1885).

Gennesaret, Sea of. See Galilee.

Genoa (Ital. Genova, Fr. Gênes, anciently Genua), a city of Italy, situated on the Mediterranean gulf of the same name, at the foot of the Apennines, is the capital of a province and the Apenmes, is the capital of a province that the most important scaport. By rail it is 801 miles SE. of Paris, 171 NE. of Marseilles, and 03 SSW. of Milan. Pop. of the town (1881) 138,081; of the commune, 179,515; pop. of the province of Genoa (area, 1672 sq. m.) 760,122.

The slopes of the hills behind the city down to the charges are capital, with hallings to record.

the shore are covered with buildings, terraced gardens, and groves of orange and ponegranate trees; while the bleak summits of the loftier ranges rising still farther back are capped with a line of strong forts, batteries, and ontworks. The fine harbour, semicircular in shape, with a diameter of rather less than a mile, is protected seawards from the south and south-east winds by two piers. In front of this inner harbour another one has been made by the construction of two onter moles. besides this, the quays of the inner harbonr have been greatly improved, and in 1889 graving-docks and other works were completed. On the north side of the port is a naval harbour and a marine arsenal; and on the east side the warehouses of the former (until 1867) free port. (4cnoa is the commercial outlet for a wide extent of country, of which the chief exports are rice, wine, olive-oil, silk goods, coral, paper, macaroni, and marble. The imports are principally raw cotton, wheat, sugar, coal, hides, coffee, raw wood, fish, petroleum, iron, machinery, and cotton and woodlen textiles. The annual exports of Genoa are valued at nearly \$4,000,000, while the imports are returned at more £4,000,000, while the imports are returned at more than £15,000,000. About 5800 vessels, of 2,970,000 tons burden, enter annually, and about 5750 of 2,979,000 tons clear, three-fourths of the vessels, with nearly one-half of the tourage in each class, being Italian. The principal industrial establishments of the city embrace iron-works, cotton and ments of the city embraco iron-works, cotton and eloth mills, nuacaroni-works, tanneries, sngar-refineries, and vesta match, fligree, and paper factories. From 70,000 to 100,000 emigrants sail every year from Genoa for South America; in 1888 the number rose to 181,437.

While strikingly grand as viewed from the sea, and so far worthy of being entitled Genova ta Superba, Genoa is in reality built awkwardly on irregular rising ground, and consists of a labyrinth of narrow and intricate lanes, accessible only to foot-passongers, or to the pack-inules by the use of which a large portion of the internal goods traffic is conducted. These thoroughfares, into which the light of day imperfectly penetrates, are lined with tall buildings, some of them of marble and of handsome architecture, but now in many eases transformed into hotels or business establishments. Of the palaces the most famous are the dueal palace formerly inhabited by the doges, now appropriated to the meetings of the senate; and the Doria, presented in 1529 to the great Genoese citizen Andrea Doria, whose residence it was during his presidency of the republic. The palaces Brignole-Sale, Reale,

Durazzo-Pallavicini, Spinola, Balbi-Senarega, and others possess great interest on account of their historical fame and architectural beauty. Many of them contain galleries of paintings; the Brignole-Sale has works by Van Dyck, Rubens, Albrecht Direr, Paolo Veronese, Guercino, &c. Foremost amongst the churches stands the eathedral of St Lorenzo, a grand old pile in the Italian Gothie style, built in the 12th century and frequently restored. In the church of St Ambrogio (1589) are pictures by Guido Reni and Rubens, and in that pictures by Guido Reni and Rubens, and in that of St Stefano an altar piece by Guido Romano; the interior of L'Annunziata is splendid with fine marbles and rich gilding. The marble municipal palace, built in the Late Renaissance style, with a magnificent vestibule, courtyard, and galleries, and the palace of the Dogana must also be mentioned. The university (790 students in 1886), originally built in 1623, reorganised in 1812, has a library of 116,000 volumes. Genoa is well supplied with technical schools and institutions for higher education. The great hospital, the asylum for the poor (provision for 2200 persons), the deaf and dumb institution, and the hospital for the insane are amongst the finest institutions of their insane are amongst the finest institutions of their kind in Italy. There are numerous excellent philanthropic foundations, as the Fieschi, an asylum for female orphans. Furthermore, we must mention the public library, containing 50,000 volumes; the Academy of Fine Arts, founded (1751) by the Doria family; the Carlo Felice Theatre, one of the finest in Italy; and the Verdi Institute of Music.

The Genoese are a shrewd, active, importons thee, and possess all the qualities of a commercial and maritime community. They make skilful and hardy seamen, and are still remarkable for the spirit of enterprise and freedom which so strongly because the period of the republic. To The Genoese are a shrewd, active, laborious race, charactorised the period of the republic. Columbus, Genoa's most famous son, there is a line

monument (1862) by Lanzio.

History.—Genoa, anciently the capital of Liguria, is first mentioned as a place of considerable importance in the second Punic war. Having been destroyed by Mago, brother of Hannibal, in 205, it was rebuilt three years later by the Roman practor Sp. Lucretius. On the dismemberment of the Latin empire Genoa fell successively under the sway of the Lombards, the Franks, and the Gernaus; but amid all these vicissitudes it preserved, in a singular degree, both privileges and prosperity. At length it succeeded in establishing its independence as a republic. Even thus early commerce was the source of its power. The frequent incursions of the Saracens, by whom Genoa was sacked and pillaged in 936, led the Genoese to form an alliance with Pisa with the object of driving the aggressors from Corsica and Sardinia, their strongholds in the Mediterranean. This being effected (1017-21), the Geneese obtained, by papal arbitra-tion, the grant of Corsica, while Sardinia was assigned to the Pisans, a distribution which sowed the seeds of future discord between the two states. At the close of the 11th century Genoa commanded large land and naval forces, and ranked as a powerful maritime state, governed by annual magistrates named consuls. The Genoese vigorously seconded the Crusades, and in return for their effective co-operation obtained several important maritime possessions and commercial privileges in the Holy Land (1109). The chief events of the three following centuries were the capture of Minorca (1146), Almeria (1147), and Tortosa (1148) from the Moors; the wars with Pisa and Venice; and the civil dissensions by which Genoa, in common with all Italy, became distracted by the Guelph and Ghibelline factions. In 1284, at the naval battle at Meloria the Pisan Republic sustained such destructive losses that her maritime influence and public spirit never revived. wars with Venice originated about 1244 in mutual jealousies respecting the commercial supremacy in the Levant, and continued, with various vicissi-tudes, till the end of the following century, when the Genoese, after the blockade of Chioggia (1379), were compelled to submit to disadvantageous terms by the peace of Turin (1381). Co-existent with this troublons external his-

tory, civil dissensions exhausted and demoralised the state, and occasioned an infinity of changes in the primitive form of government. In 1217 the consuls were supersched by a magistrate termed podesta, generally chosen from a foreign state, natives of Genoa being declared ineligible. During the next hundred years civil feuds raged inveterately, not alone between the Guelph and Ghibelline factions, but also between the patricians and the plebeians. Various other modipatricians and the plebeians. Various other modifications of the government preceded the election of the first Genoese doge in 1339. This supreme magisterial office, from which all nobles were excluded, continued in force for two centuries, its tenure being for life. But even then matters did not improve much. Finally, in 1396, the citizens, in despair, invoked the protection of the French king, Charles VI., and, after alternating between France and Milan, at last submitted to the rule of the lords of Milan (1464). In 1407 was founded the bank of St George, which oventually became a very powerful association, not only financially but also politically. From the invasion of Milan by Louis XII. in 1499 Genoa remained subject to the French until, in 1528, tho genins and resolution of French until, in 1528, the genius and resolution of Andrea Doria (q.v.) freed his country from foreign invaders, and restored to her her republican institutions. The Fieschi conspiracy, which had for its object the overthrow of Doria and the destruction of the French party amongst the nobles, was suppressed in 1647. The 17th century is marked by two wars against the Duke of Savoy (1631 and 1672) and the bombardment of the town by Louis XIV. (1684). The last important exploit of the Genoese was the expulsion in 1746 of the Austrians after an occupation of three months. In 1768 Genoa ceded to France the island of Corsica; and when Bonaparte invaded Italy he conferred (1797) on Genoa the name of the Ligurian Republic, which in 1802 was abolished, Genoa becoming the chief town of a department of France. In 1814 Lord Bentinck of a department of France. In 1814 Lord Bentinck stormed the forts and captured the city, whereupon he restored the constitution which had existed previous to 1797. In 1815, by a decree of the Congress of Vienna, the state of Genoa was made a province of Piedmont. Following the fortunes of that state, it was finally incorporated in the kingdom of Italy. The opening of the St Gothard railway has greatly increased the trade of Genoa with Germany. Sec J. T. Bent, Genoa: How the Republic rose and fell (1880).

Genoa, GULF OF, a large indentation in the northern shore of the Mediterranean, north of Corsica, has between the towns of Oneglia on the west and Spezia on the east a width of nearly 90 miles, with a depth of about 30 miles.

Genre-painting. Genre (French, from the Latin genus, 'a kind') is a term in art which was originally used to indicate simply any class or kind of painting, and was always accompanied by a distinctive adjusting a continuous a distinctive adjective or epithet, as genre historique, 'historical painting,' genre du paysage, 'landscape-painting.' The phrase genre or genre-painting, however, has now come to be applied to scenes from familiar or rustic life, to all figure-paintings, which from the homeliness of their min pictures which, from the homeliness of their subjects, do not attain to the dignity of 'historical' art. Genre-painting, in its most typical development,

may be studied in the interiors and rustic subjects of such Dutch figure-painters as Teniers, Ostade, De Hooch, Jan Steen, and Terburg. In France the most eminent genre-painters were Wattcau, Lanerot, Greuze, and Chardin; while in England the works of Hogarth, Wilkie, Mulready, and the elder Leslie may be mentioned as belonging to this class.

Gens. See FAMILY and TRIBE.

Genseric (more correctly Gaiseric), king of the Vandals, was an illegitimate son of Godigiselus, who led the Vandals in their invasion of Gaul, and who led the vancus in their invasion of Gaul, and perished with 20,000 of his followers in a defeat by the Franks (407 A.D.), who were only prevented from completely destroying the Vandals by the timely intervention of the Alans. In the year 409 the Vandals, with their friendly allies the Sucvi and the Alans, poured over the Pyrenees into Spain, and shared its territory between them. The Vandals were divided into two branches, the Asdingi, who occupied Bætica in the south. The latter, after suffering crushing defeats from the Romans, is really the formans, the first joined the former under their king Gunderic, son of Godigiselus, whose nation soon became the most powerful in the Peninsula. Gunderie died in 427, and was succeeded by Genseric. Invited to the invasion of Africa by Bonifacius, Count of Africa, who had been goaded on to rebellion through the machinations of his rival Actius, the conqueror of Attila, Genseric first crushed the Suevi, and, after numbering his united Vandals and Alans on the Andalusian shore, crossed over to Numidia in 428. Only when it was too late did Bonifacius repent Only which it was too late and Bonifacius repent his treacherous designs and attempt in vain to drive back the Vandals. After a thirteen months' siege, in the course of which the great St Augustine died, the city of Hippo Regius fell (430), and was given over to all the fury of wanton and brutal outrage. With such ferocity did the Vandals lay waste and destroy churches, fields, and cities as to leave their name after fourteen centuries a synonym for destructive barbarism. All Africa west of Carthage quickly fell into the hands of Genserie, who seized that city itself in 439, and made it the capital of his new dominions. He dated his reign, which lasted thirty-seven years, from this conquest.

With a capacity for adapting himself to new conditions which have his conquest.

ditions which shows his genius, he quickly built up a formidable maritime power, and his fleets scoured the Mediterranean and carried the terror soured the Mediterranean and carried the terror of his name to Sicily, the southern coasts of Italy, Illyrichm, and the Peloponnesus. He next portioned out the soil of the province of Carthage among his soldiers, and settled the succession. A bigoted Arian in his theology, he persecuted the orthodox Catholics in his dominions with ferocious rapacity and cruelty. The murder of the great Actins (454), and of his murderer and master Valentinian III., opened up a new field for his ambition. Endoxia, the widow of Valentinian, eager for revence upon her husband's murderer eager for revenge upon her husband's murderer Maximus, invited Genseric to Rome. The Vandal fleet reached the mouth of the Tiber in June 455. The wretched Maximus had already fallen, and the city could offer no resistance; all Pope Leo's entreaties did not save it fourteen days of devastating plunder. On leaving the city Genseric carried with him the empress and her two daughters, one of whom became the wife of his son Huneric. The empire twice endeavoured to avenge the indignities it had suffered, but without success. First the Western emperor, Majorian, fitted out a flect against the Vandals in 457, which was destroyed by Genseric in the bay of Carthagena; next, the by denseric in the pay of Carbingents; next, one Eastern emperor, Leo, sent an expedition under the command of Heraclius and others in 468, which was also destroyed off the city of Bona.

Genseric died in 477, in the possession of all his conquests, leaving behind him the reputation of being the greatest of the Vandal kings. His appearance was not imposing: Jordanes describes him as of low stature, and lame on account of a fall from his horse, deep in his designs, taciturn, averse to pleasure, subject to transports of fury, greedy of conquest, and enuning in sowing the seeds of discord among nations, and exciting them against each other. He was ruthless in his cruelty, and seems to have found impulse in the ficious and the larbour of Carthage on an expedition, the pilot asked him whither he was going. 'Against all who have incurred the wrath of God,' said the conqueror.

Gentian (Gentiuna-so called after the Illyrian king Gentius, who is said by Pliny to have introduced G. lutea into medicine), a genus of Gentianaccae. There are more than 100 species, rentiannees. There are more than 100 species, natives of north temperate regions, very often growing in high mountain pastures and meadows, which they cover with their beautiful blue or yellow flowers. The loots of the Common Gentian or Yellow Gentian (G. lutta) are collected by the peasants of the Alps (along with the less valuable roots of G. pannonica, purpurea, and punctata) to furnish the gentian root (realize gentiance) of pharmacy, which is largely employed as an excellent bitter and stomachic. The medicinal properties are essentially due to the presence of a bitter glycoside (gentiopierin); pectin (see FRUIT) and also sugar are present in quantity; hence the peasants of the Alps prepare alcoholic bittors—their Enziangeist—by the fermentation of the fresh roots. G. Catesber is used as gentian root in North America, and G. Kurroo in the Himalayas.

The florist recognises two main groups of these the horist recognises two main groups of these beautiful hardy plants, the first strong and easily grown in borders, of which the Willow Gentian (G. asclepiadea) and G. lutea are specially common. The former can also be grown with good effect under trees and among grass. The dwarf kinds require more careful treatment, with the exception of the Common Gentianella (G. gradie), which possibly

accaulis), which readily forms edgings and carpets. The name Gentianella is sometimes also applied to the allied Ciccudia filiformis, a small, slender, and graceful plant with yellow flowers. G. verna (Vernal Gentian) can be grown well in deep sandy loam, with abundant moisture and sunshine. Bavarian Gentian (G. bavarica) and Crested Gentian (G. septemfide) of the Caneasus require more moisture. Other species ean be cultivated with care. Of North American species G. crinita is specially celebrated for the beauty of its flowers; the genus in fact may fairly be allowed the very first place among the floral glories alike of Alpine regions, in which they rango up to the snow-level, and (Gentiana septemfida), of the alpine garden. Several species of Gentian are popularly called Bald-



money. See ALPINE PLANTS.

Gentianacea form an order of corollifloral dicoty. ledons. The 500 species are almost exclusively herbaceous, and are usually natives of temperate and cold latitudes and altitudes. Many have flowers of great beauty, and a general astringency pervades the order, whence many are of past or present medicinal repute. See CHIRATA, Buck-BEAN, and CENTAURY.

Gentile (Lat. gentilis, from gens, 'a nation'), in Scripture, a member of a non-Jewish nation, an alien, an unbeliever, a non-Christian. The Heb. goïm, pl. of goi, 'nation,' is used both of foreigners in general and foreigners as enemies, as heathens; so in the New Testament the Greek ethnö, 'nations,' and Hellönes, 'Guecks,' though sometimes meaning simply foreigners, non-Jews, usually had the invidious sense of unbeliever, heathen. Compare the Greek use of Barbarian (q.v.).

Gentile da Fabriano. Sce Fabriano.

Gentilly, a southern suburb of Paris, on the bas a number of villas, tanneries, and manufactures of biseuits, vinegar, mustard, and soap. Pop. (1886) 14,278, many of them employed in the neighbouring quarries and in washing.

Gentleman, in its original and strict sense, a person of noble descent. The first part of the word comes from the Latin gentilis, which signifies belonging to a gens or family. The terms gentleman and nobleman were formerly identical in meaning; but the popular signification of each has become gradually modified that of the former become gradually modified, that of the former having widened, of the latter having become more restricted. The continental noble (Fr.) or adel (Ger.) still retains the original sense of our gentleman. The broadly-marked distinction between the nobleman broadly marked distinction between the nobleman or gentleman and the rest of the community is one of the most prominent features of medieval life, and the source from which the less abrupt gradations of rank in modern society have been developed. The gentry of England had formerly many privileges recognised by law. If a clurl or peasant defamed the honour of a gentleman, the latter had his remedy in law, but if one gentleman defamed another, the combat was allowed. In cound crimes a centleman was purishable with less equal crimes a gentleman was punishable with less severity than a churl, unless the crime were heresy, treason, or excessive contumacy. A gontleman condemned to death was believeded and not hanged, and his examination was taken without torture. In giving evidence the testimony of a gentleman outweighed that of a churl. A churl might not challenge a gentleman to combat, quia conditiones impares. After the introduction of heraldry the right to armorial ensigns or insignia gentilità became (as the jus imaginum had been among the Romans) the test of gentility or nobility. Gentility was of course inherited; but it was also within the prerogative of a sovereign prince to ennoble or make a gentleman of a person of a lower grade whom he thought worthy of the distinction, and whose descendants accordingly became gentlemen. We have examples in England of the direct exercise of this prerogative by the sovereign as late as the reign of Henry VI., the patent of gentility or nobility being accompanied with no title of honour, but more with the control of the but merely with a coat of arms, the grant containing the words 'nobilitanus nobilenque facinus et ereamus . . . et in signum lujusmodi nobilitatis arma et armorum insignia danus et concedimus.' Letters of nobility of a similar description are granted by the emperor in Germany and Austria to the present day, conferring no title, but only the status of adel (nobleman or gentleman) indicated by the profix are to the surrecus A gentleman. by the prefix von to the surname. A gentleman of ancestry was (or is) something beyond a gentleman of blood and coat-armour: he must be able to show purity of blood for five generations—i.c. that his ancestors on every side for four generations described by the prefix of the prefix tions back-viz. his eight great-great grandfathers and eight great-great-grandmothers-were all en-

titled to coat-armour. This purity of blood is still insisted on for certain offices in Germany and Austria. In England the concession of insignia gentilitia (or of creating a gentleman) has long been deputed to the kings of arms, the prerogative of the sovereign in the matter of rank being directly exercised only in creating peers, baronets, or knights. In our own day, while the stricter meaning of the word is retained in the expression 'gentleman by birth,' the less abrupt gradation of ranks and the courtesy of society have caused the term gentleman to be applied in a somewhat loose sense to any one whose education, profession, or perhaps whose income, raises him above ordinary trade or menial service, or to a man of polite and refined manners and ideas. See Esquirê, Nobility.

Gentleman-commoner. See Oxford (University).

Gentlemen-at-arms (formerly called the ENTLEMEN-PENSIONERS), the bodyguard of the GENTLEMEN PENSIONERS), the bodyguard of the British sovereign, and, with the exception of the yeomen of the guard, the oldest corps in the British service. It was instituted in 1509 by Henry VIII., and now consists of 1 captain, who receives £1200 a year; I lientenant, £500; I standardterves 1200 it year; I neuterant, 1500; I standard-bearer, £310; I clork of the cheque, £120; and 40 gentlemen, each with £70 a year. The pay is issued from the privy purse. Until 1861 the commissions were purchasable, as in other regiments; but by a royal command of that year this system but by a royal command of that year this system was abolished, and commissions as gentlemen-at-arms have since only been given to military officers of service and distinction. The attendance of the gentlemen-at arms is only required at drawing-rooms, levées, coronations, and similar important state ceremonies. The appointment, which is in the sole gift of the crown, on the recommendation of the commander-in-chief, can be held in conjunction with half-pay or retired full-nex, but not tion with half-pay or retired full-pay, but not simultaneously with any appointment which might involve absence at the time of the officer's services being required by the sovereign.

Gentoo' (Portuguese Gentio, 'Gentile'), the term applied by old English writers to the Hindus, or natives of India; and in especial to the Gentoo laws, a code compiled by Sir William Jones.

Gentz, FRIEDRICH VON, politician and writer, was born at Breslau, 2d May 1764, and, shortly after ontering the Prussian civil service, published his first work, a translation of Burke's Essay on the French Revolution (1793). In 1786 he entered the public service of Prussia, but in 1802 exchanged into that of Austria, having a short exchanged into that of Austra, having a short time previously paid a visit to England, where he became acquainted with Mackintosh, Grenville, Pitt, and other public men. Throughout the struggle against Napoleon he distinguished himself by writings full of burning hatred to the French emperor. At the Congress of Vienna in 1814 Gentz was appointed first secretary, and he held the same post in nearly all the subsequent conferences down to that of Verona (1822). From 1810 onwards he laboured as an adherent of 1810 onwards he laboured as an adherent of Metternich. His writings, which are of a miscellaneous character, are distinguished for the elegance and correctness of their style. But his pen was always on sale to the highest hidder; and he drew the supplies by which he met his lavish private expenditure from more than one govornment outside Austria. He died 9th June 1832. See his Life by K. Mendelssohn-Bartholdy (1867) (1867)

Genuflexion, the act of bending the knees in worship or adoration. It is of frequent occurrence in the ritual of the Catholic Church: Catholics genuficet passing before the tabernacle where the

sacrament is reserved; the priests genuflect repeatedly during mass, &c. See KNEELING.

Genus (Lat., 'a kind'), in Natural History, a group of Species (q.v.) closely connected by company of the priests non characters or natural affinity. In all branches of zoology and lotany the name of the genus forms the first part of the scientific name of each organism, and is followed by a second word—either an adjective or a substantive—which distinguishes the particular species. This binomial nomenclature particular species. This binomial nomenclature was introduced by Linneus, and has been of great advantage, making names serve, in some measure,

for the indication of affinities.

Some genera are more satisfactory than others, the question turning on the nature of the component Species (q.v.). A genus may contain a single species—e.g. the genus Ornithorhynchus; or it may include several hundreds, and in such cases especially it is often split up into sub-genera. Groups of related genera form a family, groups of allied families form an order, and above orders are cluss and phylum. But, again, we may have an order with only a couple of living representatives, as in Proboscidea (elephants), or with only one, as in the Hyracoidea (conies). The real difficulties as in the Hyracoidea (conies). The real difficulties concern species, and will be discussed under that title. See also GENERALISATION.

Genzano, a town of Italy, on the Via Appia, 16 miles SE. of Rome, lies near the lake of Nemi, and contains the Cesarini palace. It is noted for its anunal flower festival (Inforata di Genzano), held on the eighth day after Corpus Christi, which

attracts many visitors. Pop. 5291.

Geocentric means having the earth for centre. Thus, the moon's motions are geocentric; also, though no other of the heavenly hodies revolves round the earth, their motions are spoken of as geocentric when referred to, or considered as they appear from, the earth. The geocentric latitude of a planet is the inclination to the plane of the ecliptic of a line connecting it and the earth; the geocentric longitude being the distance measured on the ecliptic from the first point of Aries to the point in the ecliptic to which the planet as seen from the earth is referred.

Ge'odes (Gr., 'earthy') are rounded hollow concretions, or indurated nodules, either empty or containing a more or less solid and free nucleus, and having the cavity frequently lined with crystals. They are sometimes called 'potato stones,' on account of their size and shape. They were the actives ('eagle-stones') of the Greeks, who asserted they were found only in eagles' nests. The eagles could not breed without their aid, and the actives were supposed to be beneficial to women in labour.

Geo'desy, the science of measuring or surveying extensive portions of the carth's surface by means of Triungulation (q.v.). The objects of the survey are generally to determine the contour and dimensions of the earth, and in a secondary degree to acquire materials and measurements for

accurate maps.

Geoffrey of Monmouth, a famous Latin chronicler, who was Archdeacon of Monmouth, was consecrated Bishop of St Asaph in 1152, and died about 1154. His chief work, the Chronicon sive Historia Britonum, was dedicated to Robert, Earl of Gloucester, and must therefore have been composed previous to 1147, the date of the latter's death. It need hardly be said that it possesses little value as history, but there is perhaps but one other book that has averaged discretization. other book that has exercised, directly or indirectly, so profound an influence upon English literature. Its author professes to have merely translated his work from a chronicle entitled Brut y Brenhined, a History of the Kings of Britain, found in Brittany, and communicated to him by Walter

Calenius, Archdeacon of Oxford; but the work is really nothing more than a masterpiece of the creative imagination working freely on materials found in Gildas, Nennius, and such chroniclers, as well as early legends now difficult to trace. as wen as early tegends now difficult to trace. In the dedicatory epistle Geoffrey describes his original as 'a very ancient book in the British tongne, which in a continued regular story and elegant style related the actions of them all, from Brutus, the first king of the Britains, down to Cadwallader the son of Cadwallo. An abridgment of the *Historia* was made by Alfred of Beverley of the Historia was made by Africa of Beverley as early as 1150, and it was translated into Norman-French by Geoffrey Gaimar in 1154, and by Wace (Li Romans de Brut) with new matter in 1180. Layamon's Brut (carly in 13th century) was a semi-Saxon paraphrase of Wace, and Robert of Gloncester's Chronicle was a fresh rhymed paraphrase of the same, which being in the native tongue helped to make the legends invented by Geoffrey widely known. The convincing circumstantiality of the story, and the ingenuity of its etymological connection of existing placenames with conymons heroes, as well as its irresistible identifications and dovetailings into British history of details of scriptural and of Roman story were sufficient for an uncritical age; and henceforward the Trojan origin of the British people became a point of patriotism and an established historical fact. The stories of King Lear and of Cymbeline, the prophecies of Merlin, and the legend of the famous Arthur in the form in which we know it, owe their origin to the rich imagination know it, owe their origin to the run magnitude of Geoffrey of Monmouth, who still influences us enormously in our Malory, Drayton, Shakespoure, Spenser, Milton, and Tennyson. Chaucer gives 'Englyssh Ganniride' a niche in his *Honse of Fame* is being 'besve for to bere up Troye,' Yet the as being 'besye for to bere up Troye.' Yet the book, even in its own day, did not altogether escape the censure of more severe historians. A Yorkshire monk, William of Newburgh, denounces Geoffrey with honest indignation as having 'lied saucily and shanclessly.' 'A certain writer has come up in our times to wipe out the blots on the Britons, weaving together ridiculous figments about them, and raising them with impudent vanity high above the virtue of the Macedonians and Romans. This man is named Geoffrey, and has the by-name of Arturns, because he cloaked with the honest name of history, coloured in Latin phrase, the fables about Arthur, taken from the old tales of the Bretons, with increase of his own.' Giraldus Cambragain partition with the fabres of the state of the control o breusis, writing within fifty years after, distinctly speaks of the book as fabulous, and gives us a somewhat singular but perfectly conclusive proof of this by relating the story of a Welshman at Caerleon named Melerius, who, 'having always an extraordinary familiarity with unclean spirits, by seeing them, knowing them, talking with them, and calling each by his proper name, was enabled through their assistance to foretell future eyents. ... He knew when any one spoke falsely in his presence, for he saw the devil as it were leaping and exulting on the tongue of the liar. . . . If the evil spirits oppressed him too much, the Gospel of St John was placed on his bosom, when, like birds, they immediately vanished; but when that hook was removed, and the History of the Britons by Geoffrey Arthur was substituted in its place, they immediately reappeared in greater numbers, and remained a longer time than usual on his body and on the book.

Geoffrey's Chronicle was printed as early as 1508. An English translation by Aaron Thompson appeared in 1718, and was issued in Bohn's 'Antiquarian Library' in 1848.

Geoffrin, Marie Thérèse, born at Paris, 2d June 1699, was the daughter of a valet de chambre named Rodet, a native of Dauphine; and in her fifteenth year was married to a very rich citizen in the Fanbourg St Antoine, who died not long after, leaving her an immense fortune. Madame Geoffrin, though herself but imperfectly educated, had a genuine love of learning and art, and her house soon became a rendezvous of the men of letters and artists of Paris. Every illustrious foreigner was welcomed to her circle, but her dearest friends were the philosophes, and upon them in their necessities she showered her money with equal delicacy and liberality. Among her friends she unmbered Montesquien, Marmontel, Morellet, Thomas, and Stanislans Poniatowski, afterwards king of Poland. The last is said to have announced to her his elevation to the throne in the words: 'Maman, votre fils est roi.' In 1766 he prevailed on her to visit Warsaw, where she was received with the greatest distinction, and subsequently in Vienna she met the same reception from the Empress Maria Theresa and her son, Joseph II. Madame Geoffrin died in Octoher 1777, leaving legacies to most of her friends. Towards the publication of the Encyclopadie she contributed, according to the calculations of her daughter, who was no friend to her nother's pet philosophers, more than 100,000 francs. The panegyries of D'Alembert, Thomas, and Morellet are to be found in the Eloges de Madame Geoffrin (1812). Morellet likewise published her treatise Sur la Conversation, and her Lettres.

Geoffroy Saint-Hilaire, ETIENNE, French zoologist and biologist, was born at Etaunpes (Scinet-Oise), 15th April 1772. He was at first destined for the clerical profession, but shortly after beginning his studies at Paris he came into contact with ning his studies at Paris he came into contact with Brisson, who awakened in him a taste for the natural sciences. He subsequently became a pupil of Hatty, Foureroy, and Daubenton. In June 1793 he was nominated professor of Vertebrate Zoology in the nowly-instituted Museum of Natural History at Paris. That same year he commenced the foundation of the celebrated zoological collection at the Jardin des Plantes. The year 1795 is marked by his introduction to his subsequent friend and scientific opponent, Georges Chvier. In 1798 Geoffrey formed one of the scientific commission that accompanied Bonaparte to Egypt, and he remained in that country until the sarrender of Alexandria in 1801. He succeeded in bringing to France valuable collections of natural history specimens; his labours in connection with this expedition led to his election, in 1807, into the Academy of Sciences. In 1808 he was sent by Napoleon to Portugal, to obtain from the collections in that kingdom all the specimens which were wanting in those of France. On his return he was appointed those of France. On his return he was appointed (1809) to the professorship of Zoology in the Faculty of Sciences at Paris. All his important works were published between this date and his death, which took place on 19th June 1844. Throughout almost all his writings we find him endeavouring to establish one great proposition—viz. the unity of plan in organic structure (see Evolution, Vol. IV. D. 481). This was the point on which he and Christ. p. 481). This was the point on which he and Cuvier mainly differed, Cuvier being a firm believer in the invariability of species, and grouping the Linnean genera under the four divisions of vertebrates, molluses, articulates, and radiates. Geoffroy also raised teratology or the study of monstrosities and anatomical malformations to the rank of a science, principally in his *Philosophic Anatomique* (2 vols. 1818-20). In addition to this he wrote *Sur l'Unité* 1818-20). In addition to this he wrote sur to me de Composition Organique (1828); L'Histoire Naturelle des Mammifères (1820-42) with F. Cuvier; Philosophic Zoologique (1830); Etudes Progressives d'un Naturaliste (1835); besides numerous papers, mostly on comparative anatomy, scattered through magazines. See Life (1847) by his son Isidore, which contains a bibliography of his works; also the Appendix to vol. i. of De Quatrefages's Rambles of a Naturalist (1863).

His son Isidore, biologist and naturalist, was born in Paris, 16th December 1805. Educated in natural listory by his father, he became assistant-naturalist at the zoological muscum in 1824. He too made a special study of teratology, publishing in 1832-37 Histoire des Anomalies de l'Organisation chez l'Homme et les Animaux. As zoological superintendent he was led to study the domestication of foreign unimals in France; and the results of his investigations appeared in Domestication et Naturalisation des Animaux Utiles (1854); in the same year he founded the Acclimatisation Society of Paris. In 1838 he proceeded to Bordeaux to organise a faculty of sciences. On the retirement of his father three years later, Isidore was appointed to the vacant chair, which in 1850 he resigned for that of Zoology at the Faculty of Sciences. In 1852 he published the first volume of a great work entitled Histoire Générale des Régnes Organiques, in which he intended to develop the doctrines of his father, but he died at Parie, 10th November 1861, before completing the third volume. He was a strong advocate of the nse of horse-flesh as luman food, and championed his views in Lettres sur les Substances Alimentaires, et particulièrement sur la Viande de Cheval (1856).

Geognosy (Gr. gē, 'the earth;' gnāsis, 'knowledge'), the stady of the materials of the earth's substance, is a term now superseded by Petrography. See Geology.

Geographical Distribution. There is no branch of scientific inquiry the interest and importance of which have grown more rapidly in recent years than that which forms the embject of the present article. In chief measure this is due to the totally different complexion given to the inquiry by the publication of the Darwinian views of the Origin of Species. As long as it was held that each species must have been created, as a general rule, within the geographical area which it now occupies, the most curious facts of distribution could be regarded only with 'eterile wonder.' But when the idea came to be entertained that allied species have had a common origin, it was obviously implied that they Geographical Distribution. There is no common origin, it was obviously implied that they or their ancestors must have had a common birth-place; and consequently, when we find incinbers of a group severed from their nearest kindred, we feel bound to inquire how this came about. Thus, whon it is observed that all the West Indian mammals, with one exception, are allied to those of America, we at once infer that the ancestors of lliese animals must have been derived from that continent, and we have to determine how the passage was made from the mainland to the islands; and the problem becomes much more difficult when we find that the single exception referred to 'belongs South America, and to a family, Centetide, all the other species of which inbabit Madagascar only' (Wallace, Geographical Distribution of Animals). Similarly, we have to explain how the tapirs are confined to the Malayan region and South America; the Camelille to the descript of Asia and the Ander. the Camelide to the deserts of Asia and the Andes; marshpials to the Australian region and America; how the mammals and birds of North Amorica resemble those of Europe more than those of South America; how the flora of Japan presents greater affinities to that of the Atlantic than to that of the Pacific States of North America; and so on.

The considerations that must be taken into account in dealing with the problems of distribution are far too numerous and complex to be gone into fully within the limits of an encyclopredia article, and all that can be done under this head is

to indicate the nature of the more important facts affecting the solution of these problems. One of the principal means of throwing light on this subject must obviously be to consider by what means animals and plants are able to disperse themselves

across the barriers at present existing.

It is scarcely necessary to draw attention to the facilities for diffusion possessed by animals endowed with great locomotive powers, and especially, among land-animals, by those having the power of flight; and in connection with this means of dispersal the most important thing to note is that some animals, which in the adult state have only feeble powers of locomotion, are better endowed in this respect in an earlier stage of existence. Such, for example, are univalve and bivalve marine molluses, which are all developed from free-swimming larva-

But, besides the normal means of locomotion, there are many other modes of dispersal which it is highly important, with reference to the present inquiry, to take into account. First, there is the power of winds as a distributing agent. The carrying power of winds is known to be sufficient to bear along in the air fine dust across seas many hundreds of miles in width; and, that being the case, we have in that agency alone an adequate means of accounting for the dispersion of all plants propagated by minute spores. For that reason the distribution of most cryptogamic plants hardly forms part of the problem eryptoganic plants hardly forms part of the problem under consideration, and is generally left out of account by those who have devoted themselves to this investigation. What part winds may have played in carrying the seeds of phanerogamous plants across arms of the sea is a more doubtful point; but there are observations which show that even for such seeds, especially when provided with some kind of feathery appendage, winds may occasionally serve as a means of transport for very long distances. Thus, Berthelot records that after a violent hurricane he saw an annual belonging to the violent hurricane he saw an annual belonging to the Composite (Erigeron ambiguus), widely distributed throughout the Mediternanean region, suddenly appear at various spots on the Canary Islands, where it was previously unknown, so that there could be hardly any doubt that the seeds had been blown across from Portugal or North Africa. Nevertheless, De Candolle has shown that seeds provided with a pappus are not on an average more widely distributed than those members of the Compositae which are not so provided, so that such a case as that just mentioned must so that such a case as that just mentioned must be looked upon as quite exceptional. But it is exceptional means of transport that is most important to consider with reference to the problems of distribution.

But, in the case of animals also, winds are a more important means of transport than one might at first suppose. Birds and insects are often blown immense distances out of their course; and to this cause, for instance, is due the arrival every year of American birds on the Bernudas. Insects have been canglit on board of ships upwards of 300 miles from land. Further, there are well-authenticated cases of even crabs, frogs, and lishes being carried long distances by storms; and in this way it is possible to account for the transference of fish, &c. from one river-system to another. Still more frequently, in all probability, are the eggs of such creatures transported by this means.

Next, marine currents also form, beyond doubt, a highly important means of dispersal both for plants and animals, and that in various ways. First, seeds may float on the surface of the ocean, and be earried by currents for hundreds of miles, and become stranded on a distant shore still in a condition fit for germination. The well-known experiments of Darwin to determine the vitality of seeds in sea-water first enabled us to appreciate the

importance of this factor in the distribution of plants. In one experiment he found that, out of \$7 kinds of seeds, 64 germinated after an immersion of 28 days, and a few survived an immersion of 137 days; and in another, that, out of 94 dried plants, 18 floated for above 28 days; and, combining the results of the two experiments, he concluded that 14 plants out of every 100 in the flora of a country night be floated by currents moving at the average rate of the several Atlantic currents a distance of 924 miles, and might, on being stranded, furnish

seeds capable of germinating.

But further, marine currents often carry on their surface various kinds of natural rafts, which may be the means of transport both for plants and animals. In the polar regions icobergs and ico-floes may serve this purpose; and elsewhere trunks of trees, and even fragments torm from the land. Such fragments, forming small islands with creet trees upon them, have been seen at a distance of 100 miles from the mouth of the Garges and other rivers. Wallace points out that ocean waifs of one kind or another are almost the only means we can imagine by which land-shells can have acquired the wide distribution for which they are remarkable. These molluses perish very readily in sea-water, but, on the other hand, are very tenacions of life in other circumstances; and this tenacity of life obviously favours their chance of heing carried in chinks of floating timber, or other-

wise, across the ocean,

Again, locomotive animals are very frequently Again, locomotive animals are very frequently the means of dispersing both plants and other animals. Seeds may be attached to the fleece or fur of mammals or the plumage of birds, or may be enclosed in dumps of earth clinging to the feet or some other part of bird or heast, even of insects. To Darwin we are again indebted for an instance showing how likely a means of transport this is. He informs us that he received from Professor Newton the leg of a red-legged partialge (Caccabis rafe) with a ball of hard earth weighing 61 annees adhering to it. The earth had been kept for three years; but when broken, watered, and covered by years; but when broken, watered, and covered by a bell-glass, as many as eighty-two plants sprang from it. Hooked fruits, such as those of agriumy, genm, &c., and fruits covered with a viscous sub stance, like those of some thistles, mistletoo, and others, are the most likely to be transported in others, are the most fixed to be unispersed in this way. It seems probable that aquatic birds and water-heetles have been the means of distributing aquatic plants and fresh-water molluses, which are remarkable for their wide diffusion; and the spawn of amphibians and fresh water fishes may be conveyed from one body of fresh water to another by the same means.

Again, seeds with hard shells are known in many cases to be capable of passing through the digestive organs of birds uninjured; and consequently fruits enclosing such seeds, or, like the strawberry, covered with them, may be devoured by birds in one place, and deposited by them in a state lit for gormina-tion at another, hundreds of miles distant. And what is of still more importance, seeds which would be destroyed if they passed through the digestive organs of a bird are quite uninjured as long as they remain in the crop, where they may be retained for twelve or eighteen hours; and thus birds killed with food in their crop may be the means of scattering seed which has travelled 500 milos. It is obvious that the migratory habits of eertain birds are of great importance with reference to hoth the means of transport just mentioned. Some seeds retain the power of germination even after passing through the digestive organs of ruminants. There is a well-established ease of a tree belonging to the order Leguminosæ having been introduced into the West Indies through cattle brought from

South America, the cattle having been fed on the voyage with the pods belonging to the tree.

Further, the parasitic habits of certain animals chable them to be carried about them. Place, when they have themselves no power, or place, when they have of locomotion. And, with only a very feelble power of locomotion. And, with regard to the subject now under consideration, it makes no difference whether the animals are truly parasitic, feeding at the expense of the lost to which they are attached, or merely commensalists, gaining their own food independently, like the sca-anemous so frequently attached to the shells of

hermit-crabs.

Lastly, man is often unintentionally the means of conveying both plants and animals from one region to another. The foreign plants found growing on ballast-heaps are instances of this, and so also are the plants which have sprung from seed introduced with imported grain or other articles of import. Since the discovery of America the whole of the northern part of the continent is said to have been more of less overrun by European weeds; and, according to Agassiz, the roadside weeds of the New England states, to the number of 130, are all European. Wherever European sailors have gone, the European rats, both black and brown, have accompanied them; and the shrew, the death's-head moth, the Sphinz convolvuli, &c., are also known to have been introduced into various countries in ships.

In the preceding summary of the more important means of diffusion for plants and animals, some of the obstacles to diffusion have been incidentally referred to; but it will be convenient to make a

general survey of these also.

For all land-plants and land-animals the most olvious and effective barrier is a wide expanse of ocean; and where the expanse is very wide it is seldom passable except with the aid of man. For land-mammals the ocean is an absolutely impassable barrier, and honee native mammals are always absent from oceanic islands (i.e. islands that have never been connected with the mainland); and this barrier is almost equally effective for serpents and amphibians, which also are nearly always wanting where there are no native manimals. Lizards are more frequently found indigenous on oceanic islands, though their means of transit from the mainland is unknown. Arms of the sea and broad rivers are likewise generally impassable for the creatures mentioned, though some of them have greater powers of swimming than is generally supposed. The jaguar, the bear, and the bison are capable of swimming the widest rivers; pigs have been known to swim ashore when earlied out to sea to a distance of soveral miles; and even a boa constrictor, it is said, has swum to the island of St Vincent from the South American coast—a distance of 200 miles.

Monntains, and especially high mountains, are also frequently effective barriers to the migration of land plants and animals; but it must be noticed that in some cases they serve for both as a means of communication between one region and another, enabling plants and animals belonging to a cold elimate, for example, to spread into latitudes where, in the plains, the climate is too hot for them. n the plains, the chinate is too hot for them. Again, deserts act as a barrier to the majority of plants and animals; forests are a barrier to the camel, hare, zebra, giraffe, &c.; treeless regions to apes, lemurs, and many monkeys; plains to wild goats and sheep. Broad rivers also act occasionally as barriers to distribution, and that, strange to say, even in the case of some species of birds.

Another important barrier is that of climate:

Another important barrier is that of climate; hut, with reference to this, it must be observed that the question of climate affects the problems of geographical distribution, in the proper sense of

that term, only in so far as climatic conditions may shut off plants and animals from means of communication between one region and another, and not where climate merely limits the range of a species or group within a continuous area. In the case of many animals climate acts only indirectly as a barrier through limiting the food-

supply required by them,

Another set of barriers may be classed under the general head of organic, inasumeh as they are all general head of organic, inasunuel as they are all connected with the vegetable or animal life of the region where such barriers exist. Under this head may be mentioned first the fact that certain animals require for their subsistence a special kind of vegetable food. The range of insects is peculiarly liable to be limited in this way, certain insects being attached to particular species of plants, and others to genera or families; and for this reason insects in suite of the exceptional this reason insects, in spite of the exceptional facilities for dispersal which, as we have already seen, they enjoy, are remarkable, as a rule, rather for the restriction of their areas of distribution than for their wide diffusion. Again, the presence of enemies is sufficient in some cases absolutely to exclude certain forms from certain areas, as the well-known tse-ise fly does horses, dogs, and cattle from a well-defined area in South Africa; and another kind of fly prevents horses and eattle from running wild in Paragnay, as they do in almudance both to the north and south of that region.

both to the north and south of that region.

But a more important, because more generally operative, organic barrier consists in the fact of a region being already fully occupied by a native flora and fauna, so that there is no room for new-comers. Hence it happens that seeds may be wafted in plenty from one country to another without a single plant growing from these seeds being able to establish itself; and there may even be as in South America a free communication. be, as in South America, a free communication with another region while the fauna remains strikingly distinct, simply because that portion of the American continent is already completely stocked with a famna perfectly adapted to the

physical conditions there prevailing.
The barriers to the spread of marine creatures are not so numerous as in the case of terrestrial forms. The freedom of communication between one part of the ocean and another makes it impossible to mark out any marine zoogeographical regions, though many seas and coasts are distinguished by characteristic fishes and other marine creatures. The principal barriers for fish are temperature and the intervention of land. Thus, the Isthuns of Panama is at present a complete

barrier for lishes requiring warm seas.

If all the barriers to migration had existed in all past time as they are now, it would be quite impossible to explain the present distribution of plants and animals on the supposition that kindred groups have had a common birthplace. But the solution of the problems of distribution is to be found in the fact that all the barriers are liable to change. Of changes of sea and land geology supplies us with abundant evidence. Portions of the mainland now continuous were at one time severed by arms of the sca; and islands have been formed by the severance of portions of land that once belonged to the mainland. Such islands are known as continental islands, and the study of their faunas and floras is one of peculiar interest in connection with geographical distribution. These farmas and floras show, as might be expected a greater or less degree of correspondence with those of the mainland from which the islands have been cut off; and the resemblance is the eloser the more recently the land connection has been destroyed. The relative date of the disunion is usually approximately indicated by the depth of the sea which now separates island and main land, shallow seas dividing portions of land that have only recently been disconnected, and deeper seas separating those which have been longer

apait

The most remarkable case of isolation is pre ented by the Australian region, the fauna and flora of which are the most peculiar in the world. In the widest sense, this region includes not only the visit island of Anstralia itself, but also New Guiner and all the Malayin and Pacific islands. to the east of a deep channel between the islands of Bali and Lombok-a channel the significance of Ball and Lombok—a channel the significance of which, as a boundary line for plants and animals, was first pointed out by Wallace, the great anthority on animal distribution, and hence known as Wallace's Line. The great feature of this region (so far as animal distribution is concerned) is 'the almost total absence of all the forms of manufacturing the abound in the last of forms of mammalia which abound in the rest of

the world, then place being taken by a great variety of maisupals. The family just mentioned, though now restricted in the manner stated at the become extinguished by the competition of later types, thus presenting one of the best examples of what are known as discontinuous areas of distribution, and offering an illustration of the mode in which such discontinuity is usually brought about. The early severance of the Arstalian region from the Assatic continent (a severance which must be referred to some period. in the Secondary Age of geologists) saved the Australian marripuls from the competition which almost extinguished the group elsewhere

Tuning now to manne distribution, we find evidence of the former absence of a land barner at the Isthmus of Panama in the identity of many species of fish on both sides of the isthmus

40 OD6 3 NEA R P I 2 3 3 NEOTROPICAL E Gu

The Zoogeographical Regions according to A R Wallace Sub regions of Oriental Region-

Sub regions of Pala arctic Region— 1 European
2 Mediciranean Siberian

Manchujan Sub regions of Ethiopian Region—

1 East African

2 West #

3 South #

4 Malagasy

Ccylonese Indo Chinese 3 Indo Malayan 4 Indo Malayan Sub regions of Austrahan Region— 1 Austro Malayan Austrahan Polynesian New Zealand

Sub regions of Ncoti spical Region—

1 Chillan

2 Brazilian

3 Maxican

4 Antillan

Sub regions of Ncountry Review

120

180

Sub I (gone of Neutche Region— 1. Califormul 2. Rocky Mountain 3. Alleghanau 4. Canadian

Changes in the chinatre barrier have also had an important influence on geographical distribution, and it is by such changes, combined with changes in the continuity of land in the north polar regions, that the affinities between the floras of Japan and eastern North America must be explained these affinities were first pointed out by Asa Gray, that distinguished botanist divined the true explanation—112 that in former geological epochs a genial climate must have prevailed even within the polar criele, so as to allow of the existence of a remarkably uniform flora, suitable to such a climate, all round the pole in very high latitudes, and that as the elimate became colder in the north this flora was driven southwards, and became differentiated according to the differences of climate in the more southerly latitudes to which it advanced Hence the eastern parts of America and Asia, as they correspond pretty much in

climate, came to correspond also more closely than other tracts in the same latitude in the character of their floras The soundness of this summer was afterwards confirmed by the discovery of abundant plant remains of the Miocene age, indicating a warm chinate in Greenland, Spitzbergen, and else where The effects on distribution of the changes of climate belonging to the period known as the Glacial Period (q τ) or Ice Age must be alluded

to here, but there is no space to do more

As the result of all the processes of dispersal across the various barriers to migration, and of the changes in these barners, we have the present dis tubution of plants and animals, which is such as to enable us to divide the tenestical surface of the globe into more or less well marked regions For animals the regions adopted by Wallace are nearly the same as those inst suggested by Sclater as applicable to the distribution of brids;

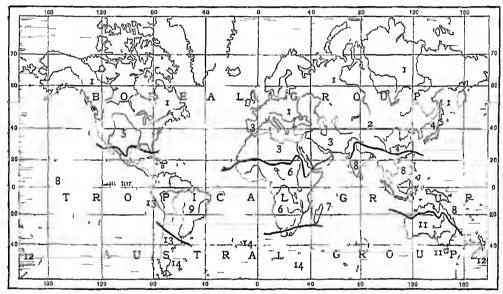
for, in spite of the exceptional facility which birds liave for crossing barriers impassable by mammals, Wallace finds that the distribution of mammals (which afford the best means of marking off zoo geographical icgions) corresponds with that of binds to an extent that one would not perhaps have previously anticipated. But with regard to these regions it innst be remembered (1) that it is impossible in most cases to draw any very clearly marked boundary line between one region and another, (2) that the degree of divergence between different regions is different in different cases, and (3) that, when any two regions are compared, we have not the same degree of diverg ence between different groups of the annual king dom, or between annuals and plants belonging to the two regions. Obviously, the degree of cone spondence depends largely on the facilities for dis persal, and largely also on the geological age of different groups, and both of these are varying factors These considerations being premised, we may now state briefly the limits of the six zoologi Island Life in the space to which the present article is necessarily restricted it is impossible to the even the most fragmentary sketch of the characteristic life of the different regions, for which the reader must be referred to the works cited at the end of the article

(1) Palæarctic Region, including Europe and north temperate Asia and Africa to the northern borders of the

(2) Ethnopun Region, consisting of all tropical and South Africa, together with Madigascan and the Mas carene Islands

(3) Oncertal Region, comprising all Asia south of the Pula netic lumis, and along with this the Malay Islands as far as the Philippines, Bonne, and Javr (4) Australian Region, as theady defined and characterised Celebes might be referred almost with equal

night to this or the previous region New Zealand is



The Terrestrial Plotal Domains according to Oscar Drude

- Northern Inner Asiatic Mediterranean 8
 - Dastern Asiatic
- 5 Central North American 6 Tropical African 7 Last African Islands 8 Indran
- 9 Tropical American 10 South African 11 Australian 12 New Zealand
- 13 Andine 14 Antarctic

treated by Wallace as a highly peculial sub-legion of

(5) Nearctic Rogion, comprising all temperate and arctio North America, including Greenland, and extending on the south to an unegular line running from the Rio Grande del Norte on the east to a point nearly opposite Cape St Lucas on the west

(6) Neotropical Region, the Amorican continent south of this line, together with the West Indian Islands

Herlpin (see below) and others advocate the union of the Nearctic and Palmaictie regions under the name of Holarctic, and introduce three transi tional tracts (the Mediterranean, embracing south ein Eniope, northern Africa, and western Asia south of the Caspian and west of India, but exclusive of the southern half of Arabia; the Sonoran tract, embracing the north west of Mexico, and the Arabia Mexico. the Austro Malaysian tract, embracing Celebes and the smaller islands lying between it and New Grinica and Australia) Otherwise his major facual divisions of the globe are similar to those of

On plant distribution the most important recent works are those of Engler and Drude (ested at

the end of the article) Engler attempts to trace the lustory of the vegetable Lingdom since the Termany period, and comes to the conclusion that aheady in the Termany period four 'floral elements' (Florenelemente) could be distinguished—namely

(1) The Aicto tentiary element, characterised by an abundance of confers and numerous genera of trees and shrubs now prevalent in North America, or in extra tropical eastern Asia and in Europe

(2) The Peleotropical element, characterised by the mesence of the families and sub families dominant in the to one of the Old World, and still more by the absence of certain families, groups, and genera found in the territory of the Arcto tertiary element

(3) The Nectropical or South American element, which,

according to Lingler, must have had in Tertiary times much the same character as that now possessed by tropi cal Brazil and the West Indies

(4) The old Occamo element, consisting of forms which possessed the power of traversing considerable stretches of ocean and developing further on islands

The modern provinces of the vegetable kingdom are subordinated by Engler to these great divisions Drude, in the first place, distinguishes the occanic

marine) flora from the terrestrial forms, and the latter he divides into three great groups, and these again into fourteen floral domains (Florenceiche), the limits of which are shown on the accompanying

See P. L. Solater's paper on the Geographical Distribution of Birds, in the Jour. Linn. Soc. (Zool.), vol. ii., and his Address to the Biological Section of the Brit. A-soc. at Bristol, 1875; A. R. Wallace's Geographical Distribution of Animals (2 vols. Lond. 1876), and his Island Life (Lond. 1880); A. Murray's Geographical Distribution of Manmals (Lond. 1866); Angelo Heilprin, The Geographical and Geological Distribution of Animals (New York and Lond. 1887); Bentham's Presidential Address to the Linnean Society, Jour. Linn. Soc., x. (Botany, introd.); A. de Candolle's Géographic Botanique (2 vols. Paris, 1855); Sir J. Hooker's Introduction to the Flora of Tassannia, and Handbook of the Flora of New Zealand; also papers by him On Insular Floras, Brit. Assoc. 1866, and On the Distribution of Arctic Plants, Trans. Linn. Soc., xxiii.; Asa Gray's Forest Geography See P. L. Sclater's paper on the Geographical Distribu-Assoc. 1866, and On the Distribution of Arctic Plants, Trans. Linn. Soc., xxiii.; Asa Gray's Forest Geography and Archeeology, in Amer. Jour. of Science and Arts (ser. iii. vol. xvi. 1875); Grisebach's Vegetation der Erde (Leip. 1872; 2d cd. 1884), and French version of the same with valuable notes, by P. de Tehihatchef (2 vols. Paris, 1875-78); Ad. Engler's Entwicklungsgeschichte der Pflanzenweit seit der Tertiapperiode (2 vols. Leip. 1879-82); Oscar Drude, Die Florenreiche der Erde (Erginzungsleit, No. 74, to Petermann's Mitteilungen, Gotha, 1884); and the chapters on Geographical Distribution in 1894); and the chapters on Geographical Distribution in Darwin's Origin of Species, as well as chap. xxxviii.-xlii.

of Lycll's Principles of Geology.

Geography (Gr. gē, 'the earth; ' graphein, 'to describe') etymologically means a description of the earth. The term as now accepted by its most competent students is applied to that department of science whose function it is to investigate the features of the earth's surface, and the distribution and mutual topographical relations of all which that surface sustains. It thus involves a study of the atmosphere or air-covering; the goosphere or land surface; and the hydrosphere or water-covering. The basis of geography is topography, including topographical relations and distribution. But to understand this thoroughly a certain elementary knowledge of various departments of science is necessary; and this knowledge is often included in what is somewhat vaguely known as Physiography (q.v.). To understand what may be regarded as the subject proper of geography—viz. the features of the earth's sunface, their distribution and relations, and the distribution and relations of the denizens of the surface-some knowledge is required of the relations of the earth to the sun and the other members of the solar system, and of the celestial sphere generally. For exact topographical observation (see Surveying) a precise knowledge of certain astronomical data is required. This department is treated in the ordinary text-books under the heading of Astronomical or Mathematical Geography. An elementary acquaintance is also advisable with certain physical and chemical facts and laws, in order to understand the action of the atmosphere, of wind, rain, iee, and water (rivers, lakes, the ocean), and those other factors which help to constitute climate, and which do so much to shape those features with which geography has chiefly to deal. Equally useful is a general knowledge of the character of the great classes of tooks which compose the surface, and of the leading families of plants and animals which cover it, especially those of economical importance. though strictly preliminary, is often included along with a study of the features themselves, in Physical Geography. The investigation of the ocean and its denizens has recently been made a new department under the title of Oceanography or Thalasso-graphy. Again, to an account of the different states or communities into which man is divided the term Political Geography is commonly applied.

Commercial Geography discusses the various countries and regions of the earth with special reference to their products and their requirements as affecting trade and commerce; and Medical Geography deals with localities as liable to become the seats of special diseases or groups of diseases.

Of course any section of geography may be treated of course any section of geography may be created and studied by itself, just as in the case of geology, or ehemistry, or physics. But for purposes of re-search, for practical results, and even for educa-tional uses, it is now considered more satisfactory to treat geography as one whole, dealing with the characteristics, distribution, and mutual relations of the great features of the earth's surface, the great classes of plants and animals which cover that surface, and of man himself. Such a study, it is maintained, is not only an excellent discipline, but the knowledge of facts and laws so obtained can be applied in many useful practical directions, Most of all it may be applied to the distribution of man in communities or states, and so, combined with other considerations, lead to a national study of political geography and the course of history. In the same way the knowledge may be applied in the the same way the knowledge may be applied in the interests of industry, of commerce, of colonisation, and in many other economical directions. Geography, when thus treated, is, it is maintained, both more interesting and more profitable than when dealt with as a mere collection of unconnected facts and factors. It has long been so treated in Germany by such geographers as Ritter and Peschel, and their in England and America. In Germany the subject in England and America. In Germany one samples is often divided into general physical and political, and special physical and political geography, the latter, of course, dealing with particular countries or legions. Of course, like all other departments of learning, the subject may be broken up into sections, and dealt with for teaching purposes, and in a more or less elementary manner. For the most elementary stage, it is now generally considered advisable to begin with the immediate topographical surroundings of the pupil and proceed ontwards. It should be stated that the eminent German geographer, Professor G. Gerland, maintains that geography has to do with the earth as a whole, and that the human side of it, or anthropogeography, belongs exclusively to history.

Special aspects of geography will be found treated under Anthrotology, Astronomy, Climate, Clouds, Earth, Ethnology, Geographical Distribution, Geology, Globe, Heat, Lakes, Latitude and Longtude, Mountains, Rain, Rivers, Sea, Winds, &c. As authorities to consult on the various aspects of geography referred to, may be mentioned litter's Erdkunde; Mrs Somerville's Physical Ceography (lalest edition); Peschel's Physicale Erdkunde, Abhandlungen zur Erdund-Vullerkunde, and Neue Probleme der Vergleichenden Erdkunde: Spees. Das Ankliz der Erde: Batzel. Ap. Peschel's Physische Erdkunde, Abhandlungen zur Erdund-Volkerkunde, and Neue Probleme der Vergleichenden Erdkunde; Suess, Das Antlitz der Erde; Ratzel, Anthropogeographie, Unser Wissen von der Erde: I. Allgemeine Erdkunde; Himman's Eclectic Physical Geography; the volume of 'Education Reports' issued by the Royal Geographieal Society, and the Lectures contained therein; General R. Strachey, Luctures in Geography; 'The Scope and Methods of Geography,' by H. J. Mackinder in Proc. Roy. Geog. Soc. (vol. ix.); 'Scientific Earth-knowledge as an Aid to Commerce,' by H. R. Mill in Scot. Geog. Mag. (vol. v. p. 302); 'Applied Geography,' by J. S. Koltie in Contenu, Rev. (Sept. 1888); Chisholm's Handbook of Commercial Geography (1889).

The facts of Political Geography will be found under the headings of the different continents, countries, and towns in this Encyclopædia. As authoritativo works on the subject (both general and political) may be mentioned Reclus, Géographie universalle (with its English translation); and Stanford's Compendium of Geography and Travel.

For the purposes of geographical discovery, or the geographical knowledge of various parts of the earth, reference must be made to the articles on continents and oceans,

and also to the articles on Charts and Maps. Here only general reference can be made to the progress of correct notions of the earth and, in connection therewith, of a general knowledge of the extent and form of the earth's surface. As the earliest efforts, within the historical period, to extend a knowledge of the earth's surface began with the Mediterranean nations of antiquity, it is natural and right to start there, although in one sense exploration is coeval with humanity.

The eurliest definite idea formed of the earth by nations emerging from a primeval condition seems to have been that of a flat circular disc, surrounded on all sides by water, and covered by the heavens as with a canopy, in the centre of which their own land was supposed to be situated. Phonicians were the first people who communicated to other nations a knowledge of distant lands; and, although little is known as to the exact period and extent of their various discoveries, they had, before the age of Homer, navigated all parts of the Euxine, and penetrated beyond the limits of the Mediterranean into the Western Ocean; and they thus form the first link of the great chain of discovery which, 2500 years after their foundation of the cities of Tartessus and Utica, was earried by Columbus to the remote shores of America. Besides various settlements nearer home, these bold adventurers had founded colonies in Asia Minor about 1200 B.C.; a century later they laid the foundation of Gades, Utiea, and several other cities, which was followed in the course of the 9th century by that of Carthage, from whence new streams of colonisation continued for several centuries to flow to parts of the world hitherto unknown. The Phomicians, although less highly gifted than the Egyptians, rank next to them in regard to the influence which they exerted on the progress of human thought and civilisation. Their knowledge of mechanics, their early use of weights and measures, and, what was of still greater importance, their employment of an alphabetical form of writing facilitated and confirmed commercial intercourse among their own numerous colonies, and formed a bond of union which speedily embraced all the civilised nations of Semitic and Hellenie origin. So rapid was the advance of geographical knowledge between the age of the Homeric poems (which may be regarded as representing the ideas entertained at the commencement of the 9th century B.C.) and the time of Hesiod (800 B.C.) that, while in the former the earth is supposed to resemble a flat eircular shield, surrounded by a rim of water spoken of as the parent of all other streams, and the names of Asia and Europe are applied only, the former to the upper valley of the Cayster, and the latter to Greece north of Peloponnesus, Hesiod mentions parts of Italy, Sieily, Gaul, and Spain, and is acquainted with the Seythians and with the During the 7th Ethiopians of southern Africa. century B.C. certain Phoenicians, under the patronage of Neku or Necho II., king of Egypt, undertook a voyage of discovery, and are reported to have eircumnavigated Africa. This expedition is recorded by Herodotus, who relates that it entered the Southern Ocean by way of the Red Sea, and after three years' absence returned to Egypt by the Pillars of Hereules. The fact of an actual eirconnection of the season enmuavigation of the African continent has been doubted, but the most convincing proof of its probability is afforded by the observation which seemed incredible to Herodotus—viz. 'that the maximers who sailed round Libya (from east to west) had the sun on their right hand.' The 7th and 6th centuries Sun on their right ment. The ren and our constraint of the were memorable for the great advance made in regard to the knowledge of the form and extent of the earth. Thales, and his pupil Anaximander, reputed to have been the first to draw maps, exploded many errors, and paved the way by their

observations for the attainment of a sounder knowledge. The logographers contributed at this period to the same end by the descriptions which they gave of various parts of the earth; of these perhaps the most interesting to us is the narrative of the Carthaginian Himilto, who discovered the British Islands, including the Œstrymnides, which he described as being a four mouths' voyage from Tartessus.

With Herodotus of Halicamassus (born 484 B.C.),

who may be regarded as the father of geography as well as of history, a new era hegan in regard to geographical knowledge. Although his chief Although his chief object was to record the struggles of the Greeks and Persians, he has so minutely described the countries which he visited in his extensive travels (which covered an area of more than 31° or 1700 miles from east to west, and 24° or 1660 miles from north to south) that his History gives us a complete representation of all that was known of the earth's surface in his age. This knowledge was extremely seanty. It was believed that the world was bounded to the south by the Red Sca or Indian Ocean, and to the west by the Atlantic, while its eastern boundaries, although admitted to he undefined, were conjectured to be nearly identical with the limits of the Persian empire, and its northern termination somewhere in the region of the amber-lands of the Baltie, which had been visited by Phonician mariners, and with which the people of Massilia (the modern Marseilles) kept up constant intercourse by way of Gaul and Germany. In the next century the achievements of Alexander the Great tended materially to enlarge the bounds of human knowledge, for while he carried his arms to the hanks of the Indus and Oxus, and extended his conquests to northern and eastern Asia, he at the same time promoted science, by sending expeditions to explore and survey the various pro-vinces which he subdued, and to make collections of all that was curious in regard to the organic and inorganic products of the newly-visited districts; and hence the victories of the Macedonian con-

queror formed a new era in physical inquiry generally, as well as in geographical discovery specially.

While Alexander was opening the East to the knowledge of western nations, Pytheas, an advent turous navigator of Massilia, conducted an expedition past Spain and Gaul, through the Channel, and round the east of England into the Northern Ocean. There, after six days' sailing, he, according to some, reached Thule (conjectured to be Iceland, although the actual locality is very uncertain), but according to the most competent interpreters of the story only heard of it. Returning, he passed into the Baltic, where he heard of the Teutones and Goths. Discovery was thus being extended both in the north and east into regions whose very existence had never been suspected, or which had hitherto been regarded as mere chaotic An important advance in geography was wastes. made by Eratosthenes (born 276 B.C.), who first used parallels of longitude and latitude, and constructed maps on mathematical principles. His work on geography is lost, yet we learn from Strabo that he considered the world to be a sphere revolving with its surrounding atmosphere on one and the same axis, and having one centre; although the belief in the spherical form of the earth was at the time confined to the learned few. He believed that only about one-eighth of the earth's surface was inhabited, while the extreme points of his habitable world were Thule in the north, China in the east, the Cinnamon Coast of Africa in the south, and the Prom. Sacrum (Cape St Vincent) in the west. During the interval between the ages of Eratosthenes and Strabo (born 66 B.C.) many voluminons works on geography were compiled, which have been either wholly lost to us,

or only very partially preserved in the records of later writers. Strabo's great work on geography, which is said to have been composed when he was eighty years of age, has been considered as a model of what such works should be in regard to the methods of treating the subject; but, while his descriptions of all the places he has himself visited are interesting and instructive, he seems unduly to have discarded the authority of preceding writers.

The wars and conquests of the Romans had a most important bearing upon geography, since the practical genins of the Roman people led them to the study of the material resources of every province and state brought under their sway; and the greatest service was done to geographical know-ledge by the survey of the empire, which was begun by Julius Cæsar, and completed by Angustus. This work comprised a description and measurement of every province by the most celebrated geometricians of the day. Pliny (born 23 A.D.), who had travelled in Spain, Ganl, Germany, and Africa, has left us a compendium of the geographical and physical science of his age in the four books of his Historia Naturalis which he devotes to the subject. He collected with indefatigable industry the information contained in the works of Sallust, Cresar, and others, to which he added the results of his own observations, without, however, dis-criminating between fact and fiction. The progress criminating between fact and fiction. that had been made since Crear's time in geo-graphical knowledge is evinced by Pliny's notice of arctic regions and of the Scandinavian lands, and the accounts which he gives of Mount Atlas, the course of tho Niger, and of various settlements in different parts of Africa; while his knowledge of Asia is more correct than that of any of his predecessors, for he correctly affirms that Ceylon is an island, and not the commencement of a new continent, as had been generally supposed.

The study of geography in ancient times may be said to have terminated with C. Ptolemy, who flourished in the middle of the 2d century of our era. His work on Geography, in eight books, which continued to be regarded as the most perfect system of the science through the dark and middle agos down to the 16th century, gives a tolerably correct account of the well-known countries of the world, and of the Mediterranean, Enxine, and Caspian, together with the rivers which fall into those seas; but it added little to the knowledge of the north of Europe, or the extreme boundaries of Asia or Africa. Yet, from his time till the 14th century, when the records of the travels of the Venetian Marco Polo opened new fields of inquiry, the statements of Ptolemy were never questioned, and even during the 15th century it was only among a few German scholars at Nuremberg that the strange accounts given of distant eastern lands by the Venetian traveller were received as trustworthy where he differed from Ptolemy.

Marco Polo had, however, unfortunately made no astronomical observations, nor had he even recorded the length of the day at any place, and hence the Nuremberg geographers, who had no certain data for estimating the extent of the countries which he had traversed, were the means of propagating errors which led to results that were destined to influence the history of mankind. For, taking Ptolemy's tables as their basis, they incorporated on their globes and maps the results of their own rough estimates of the length of Marco Polo's days' journeys, and they thus represented the continent of Asia as extending accept the Parise terms are at the Parise terms. ing across the Pacific, and having its eastern shores somewhere in the region of the Antilles.
These erroneous calculations misled Christopher
Columbus to the false assumption that, by sailing 120° W., he would reach the wealthy trading marks of China, and the result of this conviction was his entering upon that memorable expedition which terminated in the discovery (in 1492) of the continent of America. Although there can be no doubt that the American continent was visited in the 9th and 10th centuries by Northmen, the event remained without influence on the history of discovery, and cannot therefore detract from the claims of Columbus. This momentons discovery, which had been preceded in 1486 by the exploration of the African coast as far as the Cape of Good Hope (which was doubled by Vasco da Gama in 1497), was followed by a rapid succession of discoveries. Within thirty years of the date of the first voyage of Columbus the whole coast of America from Greenland to Cape Hon had been explored, the Pacific Ocean had been navigated, and the world circumnavigated by Magellan (q.v.); the coasts of eastern Africa, Arabia, Persia, and India had been visited by the Portuguese, and numerons islands in the Indian Ocean discovered.

The 16th century was marked by continued attempts, successful and unsuccessful, to extend the sphere of occanic discovery; and the desire to reach India by a shorter route than those of the Cape of Good Hope or Cape Horn led to many attempts to discover a north-west passage, many aftempts to discover a north-west passage, which, though they signally failed in their object, had the effect of very materially enlarging our knowledge of the arctic regions. The expeditions of Willoughby and Frobisher in 1553 and 1576, of Davis (1585), Hudson (1607), and Baffin (1616), were the most important in their results towards this end. The 17th and 18th centuries gave a new turn to the study of geography, by bringing other sciences to bear upon it, which, in their turn, derived elucidation from the extenin their turn, derived elucidation from the extension of geographical knowledgo; and it is to the aid derived from history, astronomy, and the physical and natural sciences that we owo the completeness which has characterised modern works on geography. In the 17th century the Dutch, under Tasman and Van Diemen, made the Ausbralasian islands known to the civilised world; and in the latter half of the 18th century Captain Cook (q.v.) extended the great oceanic explorations by the discovery of New Zealand and many of the Polynesian groups, and by proving the non-existence of a 'great Antarctic continent,' stretching far north in the Pacific. The antarctic lands were first visited in 1840 by American, English, and French expeditions, under their respective commanders, Wilkes, Rosa, and Dumont d'Urville. Polar exploration, after having been for a time in abeyance, has within late years been vigorously proscented by the United States and various European countries; and in 1879-80 Baron Nordenskjöld succeeded for the first time in history in navigating the norththe first time in history in navigating the north-cast passage round Europe and Asia. In America the travels of Humboldt, Lewis and Clark, Fré-mont, and others, and the work of the United States and Canadian Surveys, of the Argentino government explorers, and of railway pioneers, have done much to make us acquainted with broad general features, but much remains to be done in regard to special districts of central and southern America. In Asia numerous travellers, generables America. In Asia numerous travellers, geographers, and naturalists, combined with the expeditions of Russian armies, and explorers like the fate General Prejevalsky, have contributed to render our knowledge precise and certain in respect to a great part of the continent, whose natural characteristics hard of the continent, whose natural characteristics have been more especially represented by the great physicist Ritter; while we owe a large debt of gratitude to the Josuit missionaries, whose indefatigable zeal has furnished us with a rich mass of information in regard to minor details of Asiatic of Information was most the work of the Indian life and nature, nor must the work of the Indian

Survey and its European and native explorers be In Africa much light has been thrown forgotten. on the character and condition of the African continent by many of its greatest explorers—as Bruce, Park, Clapperton, the Landers, Burton, Speke, Barth, Vogel, Livingstone, Cameron, Stanley, Thomson, Schweinfurth, Nachtigal, Junker, and Emin Pasha; General Gordon and his subordinate officers; the French in Senegambia and on the Upper Niger: Wissmann and Pogge, and other officers of the Congo Free State; German explorers in east and central Africa, and the missionaries of various denominations. In Australia, although much still remains to be done, the obscurity which ming over the interior has been to a great extent diminished by the explorations of Sturt, Eyre, Leichhardt, and the brothers Gregory; and still more by the highly important labours of Burke and Wills, who in 1860 cressed the Australian continent from Melhourne to Carpentaria. The establishment in 1872 of a telegraph line from Adelaide to Port Darwin right across the continent, from and the maintenance of stations along the line, formed an admirable base for further exploration. Giles, Warburton, and Forrest forced their way in nearly parallel lines to the west coast. The labours of these and other explorers indicate that much of the continent of Australia, though often covered with dense growth of spinifex, acaeia, and eucalyp-

with dense growth of spinifex, acaeia, and eucalyptus, is not available for colonisation by Europeans. The government surveys of the various European eountries, of the British possessions, and of other eivilised states have not only added to a detailed knowledge of the face of the earth, but given us more precise ideas of its shape. Again, various deep-sea exploring expeditions of recent years, the chief among which was that sent out by the English government in the *Challenger* (q.v.), have added greatly to our knowledge of the geography of the ecenns.

ecenns.

The progress of recent discovery has been aided by the enceuragement given to exploration by the gevernments of different countries, and by the efforts of the numerous geographical societies, of which there are now over one hundred; while the constantly increasing mass of information collected by scientilie explorers is rapidly diffusing correct information in regard to distant regions.

On the subject of geographical discovery, the following works may be consulted with advantage: Bunbury's History of Ancient Geography (1880); Vivien de Sainte-Martin's Histoire de Géographie; Kiepert's Manud of Ancient Geography (1881), Précis de Géographie Universelle, by Malte Brun; Humboldt's Hist. erit. de l'Hist. de la Géographie, and the Cosmor; Ritter's Asien; Kloeden's Erdkunde; Reclus, Nouvella Géographie Universelle; Stanford's Compendium of Geography and Tracel, based on Hollwald. The recent progress of geographical discovery may be traced in Petermann's Mittallungen, the Proc. Roy. Geog. Soc., and the Geographisches Jahrbuch.

Geology (Gr. gē, 'the earth;' logos, 'a discourse') is the science of the earth—that science, namely, which has for its object the study of the various constituents of the earth's crust, with a view to discover how those materials have been aggregated and caused to assume the appearances which they now present. Geology, in short, is an inquiry into the history and development of the earth's crust, and of the several floras and faminas which have successively clothed and peopled its surface. As a science geology is comparatively young, altheugh it can hardly be doubted that from a very early period the phenomena with which it deals must have claimed some attention. It is easy, indeed, to trace in old mythelogies and legends the influence of the geological features of the land upon the human imagination. Volcanic

ernptions, earthquakes, avalanches, and landslips, the havee of torrential waters, and the destructive action of waves and breakers have unquestionably left their impress upon the superstitions and beliefs of all primitive peoples. One may believe that many of the remarkable scientific premonitions which are met with in oriental cosmogonies and the early writings of the Greeks may have been suggested by geological phenomena. The occurrence of sea-shells in the rocks of mountains and regions far removed from the sca may well have given rise to the oriental helief in the alternate destruction and renovation of the world. Pythagoras and Straho both recognised that changes had taken place on the surface of the earth, but neither appears to have got beyond the observation of a few obvious phenomena—their explanations of which are hardly entitled to be considered more than vague guesses. It is not until we reach the close of the 15th century that we find geological phenomena attracting the attention of competent observers. With the investigations of the cel-brated painter, Leonardo da Vinci, together with those of Fraeastoro, a new departure was taken. The numerous fossil shells discovered in engineering operations were appealed to by them as evidence of former geographical changes—their method of reasoning being consistent and logical. Unfortu-nately it did not convince either their contemporaries or immediate successors—some of whom held the extraordinary view that shells and other fossil organic remains were not really what they appeared to be, but the result of a plastic force which had somehow fashioned them in the lowels of the earth. Fossils were further supposed to be the results of the fermentation of fatty matter, or the results of the fermentation of fatty matter, or of terrestrial exhalations, or of the influence of the leavenly bodies, or, finally, to be simply earthy concretions or sports of nature. Others, however, while maintaining that fossils were in truth the relics of formerly living creatures, held the opinion that all these had been buried at the time of the Noachian deluge. This controversy lasted for more than a hundred years, but long after the true character of fossils had become generally admitted their entonlment in the strate continued to be their entombment in the strata continued to be attributed to the action of the deluge. This belief prevailed through the 17th and 18th centuries, and sadly interfered with the growth of geology; the prolonged infancy of which must be largely attribnted to its influence. Steno, a Dane, who lived in Italy in the middle of the 17th century, would appear to have been the first to observe a succession in the strata. Hitherte stratified rocks had not been differentiated; they were all lumped together as representing the tunultuous deposits of the Noachian deluge. Steno, however, distinguished between marine and fresh-water formations, and showed that there were rocks older than the fossilifereus strata in which no organie remains occurred. Nevertheless, this clear-sighted observer could not free himself from the fashionable hypotheses of bla day. While a belief in the universality of the Noachian deluge was prevalent, many stronge 'theories of the earth,' such as that by Bishup Burnet, saw the light. These shewed not only how the world had been evolved out of chaos, how it fared before, during, and after the deluge, but in what precise manner it was eventually to be wound up and consumed. The 'theories' referred to differed in detail, but their imaginative authors agreed in the notion of an interior abyss, whence at the time of the Noachian catastrophe the waters rushed, breaking up and bursting through the crust of the earth to cover its surface, and whither, after the deluge, they returned again.

Leihnitz (1680) proposed the bold theory that the earth was originally in a molten state, and that

the primary rocks were formed by the cooling of the surface, which also produced the primeval ocean by condensing the surrounding vapours. The sedimentary strata resulted from the subsiding of the waters which had been just in motion by the collapse of the crust on the contracting nucleus. The process was several times repeated until at

last conflibrium was established.

Hooke (1688) and Ray (1690) considered the escential condition of the globe to be one of change, and that the forces now in action would, if allowed sufficient time, produce changes as great as those of geological date. In Italy, Vallisueri (1720), Lazzaro Moro (1740), and his illustrator, Cirillo Generelli, taught that there had been depressions of the land, during which marine fossiliferons strata were deposited, and that subsequently the sea-bottom had been elevated by the subterranean forces, and converted into dry land. More main-tained the impossibility of the whole earth having been covered by the waters of the sea up to the tops of the highest mountains. The continents, he said, had been upleaved, and the fractures and dislocations of the strata were pointed to in confirmation of this view. Generelli insisted upon the gradual degradation of the land by running water, and held that the waste was so great that erentandly the monutains must be washed down to the sea. This inevitable degradation of the surface, however, would be counterbalanced, he inferred, by elevation of the land elsewhere. But as Italian geologists, in common with those of other countries, believed that the world was only some 6000 years old. More and Generelli found some difficulty in explaining how so many thousands of feet of strata could have been accumulated within the limited period allowed by the orthodox chronology. suggested, therefore, that the materials entering into the formation of the strata had been largely derived from volcanic eruptions.

Eventually the more advanced views held in Italy spread into France, Germany, and England. Buffon (1749), by the publication of his Theory of the Earth, evoked a spirit of inquiry in France; Lehmann (1756), Fuchsel (1762), and others in Germany did much to establish more correct methods of observation and interpretation of geological phenomena than had hitherto prerailed; while in England a distinct advance was made by Michell (1760) in his essay on the Cause and Phenomena of Earthquakes. The next name that comes into prominence is that of Werner, professor of Mineralogy at Freiburg in Saxony (1775). This celebrated writer framed a classification or system of the rocks of the Harz Mountains, in the order of their succession, and eonsequently in that of their formation, and maintained that this order would be found to prevail generally throughout the world. Werner's classification has proved inadequate, and even in many respects erroneous. Nevertheless, to him belongs the great merit of having brought into prominence a definite principle in the construction of the earth's crust, and a precise method of geo-logical investigation. This discovery of the fact that strata occur in a certain order of superposition had been anticipated by several Italian geologists, and by Lehmann in Germany, but Werner's fame as a brilliant investigator and attractive teacher overshadowed and eclipsed the most of his predecessors. In some respects the views of this eminent man were retrograde. He maintained, for example, that his 'formations' were universal, and had been precipitated ever the relationst had been precipitated over the whole earth in succession, from a common menstrumm or chaotic fluid. The igneous rocks, according to him, were chemical precipitates from water; he believed that no volcanoes existed in the earlier ages of the world, but that volcanic action was exclusively of modern

date. Yet the true nature of igneous rocks had already been recognised in Italy, France, England, and Germany. With the publication of Weiner's views on this subject a great controversy began, which was carried on with an acrimony that is now hard to realise. Those who upheld the igneous origin of such rocks as basalt were styled Vulcanists, while those who followed Werner hecame known as Neptunists. The great apostle of Vulcanism in Britain was James Hutton (1788). He not only insisted upon the igueous nature of basalt rocks but demonstrated in the field that granite likewise was of igneous origin. This philosophical thinker deprecated the calling-in of hypothetical causes to explain geological in of hypothetical causes to explain geological phenomena. The only agents of change, according to him, were those which are now at work in modifying the earth's crust. The past, therefore, was to be interpreted through the present. It was only through our knowledge of the methods employed by nature in carrying on her operations in our own day that we could hope to interpret the record of the rocks. The Huttonian theory was fortunate in having for its expounder John Playfair, whose famous Illustrations (1802) has long been held in the highest esteem, and is still studied by geologists. Another friend and disbeen held in the highest esteem, and is still studied by geologists. Another friend and disciple of Hutton, Sir J. Hall, became the founder of experimental geology, and did much towards the establishment of the cardinal doctrines of his teacher. Hutton's observations were confined to Scotland, in which fossiliferous strata are not received by developed. prominently developed. It was the igneous masses -the crumpled and shattered rocks of mountain —the crumpled and shattered rocks of mountain and glen and sea-coast, and the never-absent evidence of demidation and decay that fascinated him. He saw 'the mins of an older world in the present structure of the globe,' but he knew nothing of that long succession of rained worlds, each characterised by its own life-forms, with which William Smith (1790) was shortly to astonish geometric. This older has closely to a stone and problem. logists. This alie investigator alone and unaided had explored all England on foot, and succeeded in completing a geological map of the country on which the strata were for the first time delineated and thrown into natural divisions. His views as to the law of superposition among strata were arrived at independently of Werner, and he was the first by its own peculiar fossils. Hence Smith is justly entitled to be called the founder of historical or stratigraphical geology. Since then the progress of geology has been rapid. Fossils which at first were valued chiefly as marks by which one formation could be distinguished from another by and by claimed fuller attention—the classic researches of Covier in the Paris basin forming a great epoch in Paleantology (q.v.), or the study of fossil organic

In closing these remarks on the history of the geological sciences, it would be unjust to omit the name of Lyell, whose great Principles of Geology (1830-33) did invaluable service. His labours were based on those of Hutton and Playfair, but he carried ont their ductrines further in some directions than either of these geologists were propared to go, while in other directions he did not advance so far. Before the appearance of Lyell's well-known work, the Huttonian philosophy had conspienously triumphed, but geologists were still prone to account for what appeared to be 'breaks in the succession' by the hypothesis of vast catastrophes. They conceived the possibility of worldwide destruction of floras and faunas, and the sudden introduction or creation of now forms of life, after the forces of nature had such into repose. The full meaning of denudation had not as yet been generally appreciated, and subterranean

GEOLOGY

action was still frequently appealed to in explanation of orographic features which are now recogmised to be the work of epigene action. Such views gained for their upholders the name of Cataclysmists or Catastrophists. Lyell's main idea that the present is the type of all preceding ages, so far as these are revealed by the fossiliferous strata, has gained for his sehool the title of Uniformitarian. But within recent years many of his disciples have departed somewhat from the teaching of their master, and maintain that the operations of nature have been the same in kind, but not necessarily in degree. The impulse given to the advance of biological science by the publication of the Origin of Species (1859) has also affected geology, and not on its palrontological side alone. In the departments of physical and stratigraphical geology one may note a larger and broader method of treatment since the appearance of Darwin's famous work-the dominant tone in geological literature at present being rather evolutional than uniformitarian in the narrow sense. Another distinguishing feature of geological science in our day is the great attention paid to Petrography (q.v.), the study of which had fallen into comparative neglect in this country for many years. Interest in it, however, was revived by Dr Sorly, who showed how much might be learned by examining thin slices of rocks and minerals under the microscope. The introduction of the microscope into petrographical investigation has thus opened up a wide and novel field of inquiry, from the assiduous cultivation of which much may

It may be interesting to point out as shortly as possible the order of development of the geological sciences. Unquestionably the earliest to take shape was Mineralogy—a work on descriptive mineralogy by Agricola having appeared in 1546. In fact, soveral complete treatises had been published before the wideless of the latter of the published to the content of the property of the latter of the property of the latter of the lat lished before the middle of the 18th century. Geognosy, or the study of the various rocks of which the earth's crust is composed without special reference to the mode of their arrangement, was the kind of geology which chiefly occupied the attention of the earliest investigators. The term is now practically disused, and in its place we have Petrography. When employed by modern writers it has usually a wider signification (see GEOGNOSY). Structural Geology, or the mode in which rocks are built up in the earth's crust, next legan to come into prominence, and Dynamical Geology, or the study of causes now in action soon followed-the system advocated by Hutton and Playfair being that which has gained general acceptance. Thereafter followed Experimental Geology, of which Hall was the father. Although some progress had been made by Lehmann, Fuchsel, and Werner in the method of determining the succession of strata and of grouping these in chronological order, yet Historical or Stratigraphical Geology can hardly be said to have existed as a science before the date of William Smith's classical researches. Pulcontology is of still more recent origin, the names of Cavier, Lamarck, and Brongniart being conspicuous among its earliest exponents.

A brief ontline may now be given of the various

departments of geology, properly so called.

DYNAMICAL GEOLOGY.—The modern system of geology is based on the principle that the past is to be interpreted through the present. In other words, the geologist believes in the constancy of nature, and that by studying the effects produced by the action of her various agents in the present he will be able to interpret the records of such action in the past. The study of such natural operations constitutes dynamical geology.

The various forms of energy from which geo-

logical changes arise may be divided into two

Series—viz hypogene action and epigene action.

Hypogene Action.—Under this head come the changes which are induced by the internal heat of the earth, those changes, namely, that are in progress beneath the earth's surface. In this category gress beneath the earth's surface. In this category are included volcanoes and volcanic action, volcanie products, and the chemical and mechanical changes which are superinduced in such products and upon the rock-masses with which these come into contact during volcanic eruptions (see VOLCANOES). Lava (q.v.) and Tuff (q.v.) are studied as regards their composition, texture, and structure, while the manner in which these and other volcanic products are built up is likewise investigated. All this is done with a view to comparing such volcanic products with similar crystalline and fragmental rocks which occur in regions where volcanie action may have become quite extinet. Another most important set of hypogene phenomena are movements of the carth's crust. See EARTHQUAKES, UPHEAVAL, BEACHES (RAISED), SUBMARINE FORESTS.

Epigene action has reference to those operations that affect mainly the superficial portion of the earth's surface. The epigene agents are the atmosphere, rain, brooks and rivers, iee, the sea, and life. The effects of atmospherie action are seen in the general disintegration of rocks, the formation of Soil (q.v.), and the accumulation of dust and sand (see DRIFT). In the diffusion of life over the globe, wind has also no doubt played in all ages an important part. Rain, again, charged with the carbonic acid, &c., which it absorbs from the atmosphere and vegetable soil, acts chemically upon since and vegetaries son, acts chemicary into rocks—all of which are more or less permeable. Much rock-disintegration is thus induced, the 'weathered' materials being dispersed or accumulated locally by the mechanical action of the rain. The chemical action of rain is not confined to the surface of the ground, for much water litters down through natural cracks, fissures, &c., and is thus enabled to soak into the locks at all depths. The underground water which is not absorbed in the interstitial pores of rocks rises eventually, and is discharged at the surface as Springs (q.v.), which are more or less imprognated with dissolved mineral matter abstracted from below. These springs are either cold or thermal, and constant or inter-In some volcanic regions the water comes to the surface in eruptive fountains (see GEYSERS). The destructive action of such underground waters is seen in the excavation of caves, tunnels, and other subterranean passages (see CAYES), and in the production of Landslips (q.v.) and rock-falls; while their reproductive action is familiarly illustrated by the formation of Stalactites and Stalagmites (q.v.), and the accumula-tion of great masses and sheets of siliceous Sinter and Calcareous Tufa (q.v.). Brooks and rivers act as potent agents of change. By means of the detrius which they sweep along or carry in suspension, they rul, grind, and erode the rocks over which they flow, and thus in time ravines and valleys have been excavated. The eroded materials are constantly travelling from higher to lower levels until they come to rest in lakes or the sea. Hence lakes and the sca in many places are being gradually silted up—the growth of Doltas (q.v.) being one of the most notable evidences of epigene action. The action of rain and running water is greatly aided by frost, which is a powerful disintegrator of rocks. Water freezes as well in the minute pores of rocks as in the fissures by which rocks are traversed, and thus when thaw ensues the loosened grains and partieles are ready to be earried away by wind, rain, and melting snow; while disjointed blocks, &c. may fall asunder and topple from cliffs or roll down steep slopes. In regions of

erennial snow-fields the avalanche and the glacier perennial snow-nears the avanances of the surface, likewise act as important denuders of the surface, and transporters of rock-debris from higher to lower levels (-see AVALANCHES, GLACIERS, BOULDER-CLAY, &c.). Again, in certain latitudes lake and liver ice are conspicuous agents of change—acting especially as rafts for the transport of stones and debris (see Anchor Ice). Thus the whole surface of the land from the highest maintains down to the sea is being gradually degraded or lowered by the combined action of many epigene agents. There is a continual and universal disintegration of rocks going on, and a no less continual transport of material and building up of this into new forma-tion. Alluvial flats and terraces, deltas, &c. may be cited as prominent examples of the sedimentary series of modern accumulations, while the chemical series is well represented by the calcareous formations of springs and brooks, and the precipitations of common salt, sulphate of lime, &c., which are taking place in saline lakes (see LAKES).

The sea as a geological agent acts in three ways: it crodes rocks, and transports and accumulates sediment. The work of crosion is confined for the most part to that marginal belt within which waves and breakers work. These by means of the shore-detritus batter and undermine cliffs, and shore-defirities batter and indermine chils, and cause them gradually to recede, and hence the scamay be said to act like a great horizontal saw. The materials brought down by rivers or detached from the shore by the action of the sea itself are distributed by currents over the sea-floor, the coarser detritus gathering in shallow water, while the thory to invent is event out to greater deaths. the finer sediment is swept out to greater depths and spread over wider areas. Such terrigenous materials extend ontwards from the shore to a distance of 60 to 300 miles, and to depths of 2000 feet or more. They are confined, therefore, to a comparatively narrow belt of the sea-bottom. Over the abysinal depths of the sea, the only accumulations in progress are organic coze and a peculiar red elay which is believed to be the result of the chemical action of sea-water on products of volcanic origin (see ABYSMAL ACCUMULATIONS).

Now and again, stones and debris may be carried out to sea by icebergs and dropped beyond the zone of terrigenous sedimentation. Similarly, rock-fragments entangled in the roots of trees or broyed up by seaweeds may now and again come to rest in abysmal regions. Reference has been made to the dependent action of the ice of lakes and rivers, but the icebergs and ice-rafts of high latitudes must not be omitted.

Much rock-debris is distributed over the sea-bottom, detached fragments of the 'lee-foot' (q.v.) being the most notable carriers of stones.

The action of plants and animals is not ignored by geologists. Plants aid in the disintegration and rupture of rocks by means of their roots and the organic acids derived from them during decay. Rocks are drilled and bored by some kinds of marine molluses, annelids, echimi, and sponges, and are thus weakened and more readily yield to the action of waves and breakers. Burrowing animals also bring about changes, the common earthworm being an efficacious agent in the formation of soil (see EARTHWORM). Plants occasionally act as conservative agents, as in the fixing of blown sands (see DUNES), and in protecting the banks of blown shared where and since ARTH for the banks of lakes and rivers. Again, forests, by equalising and regulating the flow of the water of precipitation, prevent the destruction of soils and subsoils by torrential action. In some regions also the rocks along a seashore are partially protected from the waves by seawced, sponges, zoophytes, and gregarious molluses. Amongst formations of organic origin may be mentioned soil (in part), peat-bogs, morasses, mangrove-swamps, bog-iron ore, &c.

Some calcareous algae also form considerable beds, as among the reefs of the Florida seas; while certain marsh-loving and fresh-water plants have the power of abstracting carbonate of line from water and enernsting themselves therewith. Thick masses of calc-tufa have originated in this way. The organic oozes of the deep seas are good examples of de-posits formed of the examine of minute pelagic organisms; and the great coral-reefs (see CORAL) of the warmer oceans are still further evidence of the inportance of life in the production of new formations. Such are some of the accumulations which are almost wholly composed of organic debris; but animals and plants contribute to the growth of many other deposits. The marine terrigenous formations are charged more or less abundantly with the value of animal and and the less abundantly with the relics of animal and plant life; nor are similar remains wanting in the alluvial deposits of nivers and lakes.

Petrology.—From the study of causes now in action the geologist learns that many of the rocks, with which every one, whether observant or not, necessarily makes some acquaintance, are of the same character as epigene and hypogene pro-For a particular account of the rocks themducts. For a particular account of the locks themselves, Petrography and the articles therein cited may be consulted; here all that can be attempted is to point out very briefly how far a knowledge of

the nature and origin of rocks.

(1) Igneous Rocks.—In Great Britain and other countries where at present there is no volcanic action we meet with various glassy rocks, such as pitchstone and obsidian, with semi-crystalline rocks, as trachyte, phonolite, liparito, andesito, basalt, &c., with crystalline rocks, such as cortain dolcrites, and with fragmental rocks, like tuil and agglomerate, which in every essonial particular resemble the products of modern volcanoes. But, as might have been expected, the older igneous rocks are often more or less altered, such alteration having been superinduced by the elemical action of percolating waters, by pressure, by crushing, or by those and other causes combined. There is a class of crystalline rocks, however, which, although they consist of the same universal ingredients as occur in many igneous rocks, yet differ so materially in character from lavas that geologists are warranted in believing that they could not have been consolidated at or near the surface of the earth. This class is represented by such rocks as gianite, syenite, gabbio, and certain diorites, dolerites, quartz-porphyries, &c. A study of these rocks under the microscope and in the field as rock-masses leads to the belief that they are indeed of igueous origin, but have cooled and consolidated at some depth in the earth's crust, their appearance at the surface heing due to subsequent denudation. Thus two classes of igneous rocks are recognised--viz. vol-

canic or superficial, and plutonic or deep seated.

(2) Derivative Rocks.—Under this head are included all the products of epigeno action. They are termed derivative inasmuch as most of them are composed of materials which have been derived from pre-existing rocks by the chemical or mechanical action of epigene agents, while others are made up of organic debris. They may be roughly classified as follows:

Mechanically-formed Rocks.—These consist of agmental materials. They are granular nonfragmental materials. ragmentar materials. They are granter non-crystalline aggregates, the constituent ingredients of which may be angular or rounded in form, and may or may not be arranged in layers. They consist of (a) Eolian or Acrial rocks, such as blown sand (dunes) and dust-deposits. The products of the 'weathering' action of the atmosphere, such as rock-debris (breccia), certain clays, &c., are also in part of colian origin. (b) Sedimentary rocks,

as conglomerate, breccia (in part), sandstone, graywacke, various clays, mudstones, shales, &c. (e) Glucial rocks, as rock-debris, erratics, moraines,

boulder-clay, &c.

Chemically-formed Rocks.—The rocks included under this subdivision are sometimes earthy in character, but more frequently show a crystalline or compact sub-crystalline texture. Among the more typical kinds are kaolin and various other clays, stalactites and stalagmites, eale-tufa and its varietics, geyserite (siliceous sinter), rock-salt, dolomite, gypsum, flint, chert, various ironstones,

Organically-derived rocks are made up of the relies of animal and plant life. They include a great variety of limestones, diatom-earth (tripoli), flint (in part), various phosphatic deposits, peat, lignite, coal, authracite, oil-shale, various iron ores,

No hard and fast line can be drawn between the older and younger products of epigene action. It is obvious that conglomerate and sandstone are merely compacted gravel and sand; breccia is only consolidated rock-debris; while lignite and coal are simply vegetable matter more or less mineralised. The thick fossiliferous limestones of the earth's crust are paralleled by the coval-reefs and organic oozes of existing oceans, and have evidently had a be compared with a like product of modern epigene action. The older products, it is true, are most froquently solidified, while the younger are oftener more or less incoherent and unconsolidated. But this difference is not essential, and is only what might have been expected. The older products have for a long time been exposed to the action of percolating water. In many cases they have been subjected to the influence of subterrancan heat and enormous pressure, and we need not wonder, therefore, that they should have acquired a more or less indurated character. But solidification does not invariably characterise the older products, nor are modern accumulations always incoherent. There are indurated conglomerates and sandstones of very recent formation, and some modern coral-rock is as hard and compact as the older limestones. the term rock is applied to all the products of epigene and hypogene action alike, whether the material so designated be yielding, as clay and peat and blowing sand, or hard and resisting, as conglomerate, limestone, or granite.

(3) Metamorphic Rocks.—All rocks somer or later undergo some process of alteration whereby their original character becomes modified. Thus, by the chemical action of percolating water some lime-stones have been more or loss changed into dolomite; olivine rocks have been altered into serpentine; some sandstones have been converted into quartzites. Derivative rocks at the point of contact with igneous rocks are very frequently altered to a greater or less extent. Thus, ordinary limestone becomes crystalline marble, coal is changed into graphite, sandstone into quartzite, clay and shale into porcellanite. When alteration of a rock, however caused, has proceeded so far as to produce a rearrangement of the constituent elements of a rock, and to develop a crystalline or semicrystalline structure, such extreme alteration is termed metamorphism, and the rocks so affected are described as metamorphic. Rocks of this kind are sometimes confusedly crystalline or massive in structure, and in hand specimens might be mistaken for plutonie igneous rocks; but by far the larger number are distinguished by a peculiar flaky or pseudo-lamin-ated structure which is termed Foliation (q.v.). In foliated or schistose rocks the constituent minerals are arranged in alternate lenticular layers which merge into each other. Such arrangement,

it must be understood, has no relation to the layers of deposition so frequently present in derivative rocks like shale, sandstone, &c. The foliated structure has been superinduced in rocks, some of which may have been ignous and others aqueous in origin. It is obvious, however, that the study of causes now in action can throw little light on the origin of foliation. We may study the changes induced in rocks by contact with the products of modern volcanie action, and these will doubtless enable us to understand how certain alterations in rocks have been brought about; but schistosity is not superinduced in rocks in the neighbourhood of modern volcanic orifices. In Britain and other countries, however, demidation has exposed the interior and basal portions of ancient volcanoes, and we can now study in detail the fractured and baked rocks through which heated gases, molten matter, &c. have been erapted. Nay, in some eases, we can even examine enormous masses of plutonic crystalline rock which are believed to be the reservoirs from which the molten matter of our ancient volcanoes was primped to the surface. Such great plutonic masses are frequently surrounded by a zone or belt of crystalline schistose rocks, such as gueiss, mica-schist, &c. The rocks are most crystal-line and schistose in the immediate proximity of the igneous mass, but gradually lose these characters as they recede from its neighbourhood, until by-and-by they pass into ordinary derivative rocks sneh as graywacke, shale, &c. Some schistose rocks, therefore, undoubtedly owe their origin to contact with deep-seated igneous masses. Again, it has been observed that where rocks, whether igneous or derivative, have been subjected to enormous crushing and pressure, they not infre-quently become crystalline and schistose. There are some schistose rocks, however, the origin of which is still very obscure. Geologists cannot yet assert, therefore, that all schistose rocks are metamorphic (see Archean System). Among the most characteristic metamorphic rocks are quartzite, marble, phillite, mica-schist, tale schist, chlorite-schist, hornblende-schist, actinolite-schist, gneiss, granulite, eclogite, &c.
STRUCTURAL OF GEOTECTONIC GEOLOGY is that

branch of the science that deals with the arrange-

ment or structure of rock-masses.

Structure of Igneous Rocks.—Igneous rocks are grouped under two series—viz. (a) Contemporane-

ous and (b) Intrusice emptive rocks.

(a) Contemporaneous cruptive rocks are either erystalline or fragmental. The crystalline rocks are simply old lava-flows, while the fragmental rocks consist of tuff and its varieties. They are in short the products of volcanic action, and have been empted at the earth's surface, accumulating either upon the land or under water. Many of these rocks have apparently been empted from vents of the ordinary modern type, but others appear to have come up along lines of fissure in the earth's crust—the lavas overflowing the surface in broad floods. Successive ontilows of this kind, accompanied frequently by the ejection of frag-mental materials, have built up some great plateaus. Contemporaneous lavas are generally more or less scoriaceous or porous above and below.

(b) Intrusive eruptive rocks are also crystalline and fragmental. Necks are approximately cylindrical funnels filled with either crystalline igneous rock or fragmental materials, or with both. They are obviously the plugged throats of old volcanocs, the upper parts of which have been removed by denuda-Intrusive Sheets are more or less lenticular masses of erystalline igneous rock which have been erupted amongst strata in a direction more or less closely conformable with the planes of bedding They seldom show any scoriaceous structure, and

generally bake and alter overlying as well as underlying rocks—thus clearly indicating their subsequent origin. *Dykrs* (q.v.) consist generally of crystalline rock which has been empted in approximately vertical and even-sided fissures, thus Occasionally giving rise to wall-like intrusions. fragmental igueous rocks, such as agglomerate, are met with in similar positions. Veins is the term applied to smaller irregular and more or less tortuons intrusions of crystalline rock. Bosses (see NECKS) are amorphous masses of crystalline rock, using more or less vertically through surrounding rock-masses. There is reason to believe that many of these 'bosses' are the deep-seated reservoirs from which volcanoes were supplied with lava. 'Dykes,' 'veins,' and sometimes 'sheets' proceed from them into the adjacent tocks, which are often

much altered and inctamorphosed. Structure of Derivative Rocks.—The most characteristic feature of these rocks is their bedding or stratification-a structure which is due to the mode of their accumulation. Hence they are often spoken of as the 'stratified rocks.' But, as we have seen, stratification likewise characterises contemporane. ons emptive rocks. As far the larger number of derivative rocks are simply aqueous mechanical and chemical sediments, they are also often termed 'aqueous' and 'sedimentary rocks.' Individual beds in a group of strata are lenticular or wedge-shaped; so that when any particular stratum is followed in one direction it eventually thins away and dies out. And the same is the case with groups of strata. Fine-grained deposits such as shale and limestone tend to be more persistent and to cover wider areas than sandstones and and to cover wheer breas than sandstones and conglomerates. Almost any diversity of strata may occur in a group or series, but it is more usual to find certain kinds of rock associated together; thus, fine sandstone alternates with shale, conglomerate with grit, limestone with fine shales, &c. Again, individual beds are often found to change their character as they are followed in certain directions. Conglomerate, for example, passes laterally into sandstone, sandstone becomes argillaceous and passes into shale, while shale, by the gradual increase of calcareous matter, becomes marly and often passes into limestone. Sometimes the stratification is extremely regular, at other times the heds thicken and thin out very irregularly, and not infrequently they show what is called fulse-bedding or current-bedding—a structure which is seen both in aqueous and colian accumulations (see DUNES). Amongst the surface-markings seen in sedimentary rocks the most common are ripple-marks, sun-cracks, rain-prints, and tracks, trails, burrows, &c. of worms, crustaceans, mol-

luscs, reptiles, birds, &c. Strata are not often quite horizontal; they usually dip at a less or greater angle, and such inclined strata are as a rule the remaining portions of large curves or undulations, the upper portions of which have been removed by denudation, so that the truncated strata erop out at the surface (see Outcrop, Strike). The simplest form of curve assumed by strata is a Monocline (q.v.), but anticlinal and synclinal folds occur nucl more frequently (see ANTICLINE). In strata with a moderate dip the strata on opposite sides of an anticlinal axis incline at approximately the same angle. But in more steeply inclined beds the dip is often greater on one side than the other, the beds on the steeper side of the fold becoming doubled in below their equivalents on the other side. This is what is termed 'Inversion' -a structure which whon repeated gives us what are called 'Isoclinal Folds' (see MOUNTAINS). In regions of highly folded strata the fossils and even the stones in conglomerates are often flattened

and squeezed out of shape. Such deformation likewise characterises whole rock-masses, as is well seen in the structure termed Slaty Cleavage (q.v.). As an extreme result of enormous pressure we occasionally find that clastic rocks have been converted into crystalline schists.

Most rocks, as well igneous as derivative, become gradually more and more consolidated. Soft incoherent sands and clays are compressed; lavas cool and harden. All rocks therefore tend to contract, and in doing so they become eracked, regularly or and in doing so they become eracked, tegithary or irregularly as the case may be. During the process of folding they have likewise yielded to stress and strain by cracking across. Such cracks are termed Joints (q.v.). But rocks are not only termed Joints (q.v.). But rocks are not only jointed; frequently they are traversed by great fissures of displacement called Faults or Dislocations (q.v.), which may sometimes be traced across the whole breadth of a country. That the phenomena whole breadth of a country. That the phenomena of folding, fracturing, and displacement are the result of earth-movements cannot be doubted, and there is abundant evidence to show that such disturbances have taken place again and again, sometimes over limited regions, at other times over very much wider areas. This is proved by the phenomena of Unconformity (q.v.), in which one set of beds rests on the upturned and denuded ends of an older series.

The fissures and cavities of rocks are in some places filled up again by the introduction of various kinds of mineral matter through the chemical action of percolating water. In many cases such minoral deposition may have taken place from heated solutions, under great pressure, and at great depths from the surface. This is probably the origin of many of the Ure-deposits (q.v.) mot with as lodes or

veins.

PALEONTOLOGICAL GEOLOGY.—A study of the physical characters of rocks enables the goologist to arrive at many interesting couclusions as to the mode in which rocks have originated. By such evidence alone it is sometimes possible to discover the successive changes which some particular region has undergone. Thus, the phenomena of ignoons and glacial accumulations tell their own story, and even in the case of many sedimentary deposits geologists are able, without the aid of fossils, to distinguish between deep-sea and shallow-water strata; while certain rock-structures, such as unconformity, yield him evidence of changing physical conditions. Without fossils, however, investigations into the successive phases through which the earth's surface has passed could not proceed far: historical geology would be impossible. It is chiefly by means of Fossils (q.v.) that the deep-sea or shallow-water origin and the marino or freshwater character of strata are determined, and the elimatic conditions under which they were deposited are ascertained. When we learn that many fossils belong to extinct species and even genera, and that different groups of fossils occur in different scries of strata, it might seem, at first, as if this would tend rather to confuse than aid the geolo-But the cause of such apparent discropancies lies, of course, in the simple fact that the fossiliferous strata belong to different ages-some are much older than others. In the uppermost or youngest series the organic remains approach most nearly to the life-forms of the present day, while in the lower and therefore older strata the fossils recede farther and farther from existing types as we follow them to lower and lower geological horizons. From this it would appear that there has been a gradual coming in and dying out of species, and observation has shown that when a particular flora or fauna has died out it never reappears in younger strata. When William Smith discovered that each well-marked group of strata was charae-

terised by its own snite of fossils he had got the key to the history of a long succession of geological changes; for the fossils enabled him to recognise each group in whatever part of the country it occurred, and however much its petrographical character might have changed. If three conformable series of strata occur in the order A, B, C— B superimposed on A, and C upon B, that order is never reversed elsewhere. Each term of the series may not always be present-either one or more may be absent—but those that do occur always occupy the same relative position. In such a conformable to itself, but a larger or smaller number will usually be found to range from one group to another, or even from top to bottom of the whole. The fossils will, in short, indicate a gradual change of fanna and flora, as we pass from below upwards old forms disappearing, new forms appearing. But blund the middle term of the series (group B) be wanting, then the pussage from A to C, owing to the absence of the connecting forms belonging to B, will be more or less abrupt. A conformable sequence, like A, B, C, points to the persistence of similar physical conditions during a longer or shorter period. If the fossils in each group indicate a sea of moderate depth while the stratum attains a thickness of several thousand feet, the inference will be that sedimentation has taken place during a slow movement of subsidence. In other words, the silting-up of the sea has been retarded by the gradual sinking-down of its bottom. On the supposition that the accumulation of the strata has been a very protracted process, the marine fauna will have undergone more or less modification. Such change in the life-forms, however, will probshell change in the ine-torms, nowever, will probably have been very gradual; some species remaining longer unmodified than others, while a few may persist unchanged through the whole period of sedimentation. In the case of an unconformable sequence—where C rests directly on A, the physical conditions have evidently not remained constant. After the deposition of A, a movement of unbeaval has ensual; the sea has disconvenent of upheaval has ensued; the sca has disappeared and land has taken its place. Should land-eonditions have continued for a very prolonged period before subsidence supervened and the area once more became submerged, the marine fauna will, in the meantime, have undergone more or less modification in those regions to which it migrated while elevation was in progress. Thus the sediment (group C) which subsequently accumulated over the drowned land-surface would come to contain a snite of organic remains that might differ greatly from those occurring in the immediately subjacent group A. And the longer the interval between A and C, the more strongly marked would be the break in the succession of life-forms. Such 'breaks in the succession' are of common occurrence-local and more widely spread movements of depression and elevation having characterised the formation of the fossiliferous strata everywhere. When it is remembered that every bed of aqueous rock has been formed out of the ruins of pre-existing rocks, igneous or derivative, or both, it is obvions that the fossiliferous strata cannot possibly eontain a perfect record of all the forms of life which may originally have been entombed in sediment. Many fossils must have disappeared along with the rocks which contained them. Thus, in the case of such a 'break in succession' as that just described, it is obvious that the strata of group A would be more or less denuded before group C began to be accumulated—C would rest unconformably upon A. Nor can we believe that the life-forms of carlier ages were ever more fully represented by fossils than existing faunas and floras will be by the remains of living things which

are now being buried in sediment. Of the myriads of existing terrestrial plants and animals how few will leave any relic behind them! Aquatic, and more especially marine forms, will doubtless be preserved in far greater variety and abundance; but amongst these are many delicately-fashioned and soft-bodied creatures which can only become fossils by accident, as it were. Such considerations as these should lead us to expect that the fossiliferons strata, even when these have apparently been accumulated in a continuous manner, will contain a most imperfect record of the past life-history of the globe. But notwithstanding this imperfection of the geological record there is yet ample evidence to show that gradual extinction of old and evolu-tion of new faunas and floras has been the rule. Life has been persistent from its introduction, but subject to endless modifications. With this contimuity in geological history it is obvious that any subdivisions of past time that we choose to make must be arbitrary, for the germ, as it were, of one so-ealled period must have begun in the period so-ealled period must have begun in the period that preceded. But, just as in human history it is convenient to use such terms as the 'Middle Ages,' the 'Elizabethan Period,' &c., so in geology it is useful and indeed necessary, for purposes of description and correlation, to group the records into so many subordinate divisions. 'Unconformities,' breaks in group start of the period of the pe 'breaks in succession,' &c. often enable this to be done with more or less ease; but in the case of the better-preserved portions of the stony record it is often very hard to say where a division line should be drawn.

HISTORICAL GEOLOGY.—The forms of life that existed during some prolonged period of the past have a certain facies which serves to distinguish them as a group from the living things that flourished in preceding and succeeding ages. And the strata which contain such a well-marked assem-System. By this term, then, is understood all the deposits, whether terrestrial, fresh water, or marine, which accumulated over the earth's surface upon land, in lakes, or in the sea, at a time when the world was characterised by the presence of some particular and peculiar fauna and flora. By com-paring and correlating the fossiliferous strata throughout the world geologists have been able to arrange the various systems in chronological order. The following table shows the larger divisions and subdivisions in the order in which they would appear if they all occurred in one and the same section. (Each system will be found described under its own title.)

4. QUATERNARY OR POST-TER- | Recent System. TIARY. Pleistocene n Pliocene Miocene 3. TERTIARY OR CAINOZOIC. Oligoceno Eocene Cietaceous 11 Jurassic Trassic (Permian 2. Secondary or Mesozoio.

1. PRIMARY OR PALÆOZOIC.

Carboniferous System. Old Red Sandstone and Devonian System. Silurian System. Cambrian " Archeean "

PHYSIOGRAPHICAL GEOLOGY .- Under this head is discussed the origin of the surface-features of the land-mountains, valleys, &c. The study of causes now in action shows that everywhere rocks are undergoing disintegration, the resulting detritus gradually travelling from higher to lower levels until eventually it reaches the sea. This continuous and universal denudation is easily read in the present appearance of the rocks forming the surface of the land. The phenomena of truncated strata, faults, &c. (see DENUDATION) demonstrate

that thousands of feet of rock have been gradually removed in the form of detritus. To appreciate this fact some knowledge of structural geology is necessary. In regions which have long been exposed to denudation we recognise a very remarkable connection between the configuration of the ground connection between the configuration of the ground and the nature and mode of arrangement of the rocks. The valleys and low grounds, for example, coincide in a general way with the distribution of the less dutable rocks, while escarpments, hills, and ridges mark out the sites of the more resisting took-masses. Again, in the case of undulating and falled parts it was the groundly however, that are folded strata, it most frequently happens that anticlines instead of forming hills give rise to valleys, while synclines correspond as a rule not to valleys but to hills. The reasons are obvious, for relatively hard rocks resist denudation better than softer rocks; and, while an anticlinal arrangement and the jointing of strata favour the action of the denuding agents, in the case of synclinal strata the reck-structure has just the opposite effect (see LANDSLIPS, MOUNTAINS). Thus the features im-pressed upon the laud by denudation depend partly upon the composition and texture of the rocks, and partly upon their structure as rock-ma-ses. In the case of a true mountain-range of recent elevation the larger feature, of the surface correspond in a general way with the folds of the strata. Thus the mountainridges often run in the direction of great anticlinal axes, while the long parallel valleys coincide with synchial axes (see Alps). But even in the case of mountains of elevation denudation has often profoundly modified such features. Anticlinal mountains are very unstable; reck-falls and landslips from time to time take place; and the tendency is for all mountains of that character to become effaced. Sooner or later the orographical features change, and are eventually determined by the epi-gene agents, directed and controlled by the com-position and structure of the various rock-masses. Geologists recognise three kinds of mountains: (1) Mountains of Arcumulation, such as volcanoes; (2) Mountains of Upheaval, such as true mountain-ranges like the Alps; and (3) Mountains of Circumdenudation, which owe their origin to the removal of material that formerly surrounded them, such as the mountains of the British Islands.

A plateau or tableland is simply an elevated plain, and may consist either of approximately horizontal sheets of rock, like the plateau of the Colorado, or of more or less highly folded and even centorted strata, which have been planed down to one general level, like the plateaus of Scandinavia and the Scottish Highlands. Both kinds of tableland are usually traversed by valleys, which have been excavated by running water, and sometimes, as in the case of the Scottish Highlands, they are so highly denuded that their plateau-character becomes observe. Plateaus owe their elevation to uphcaval, those which are built up of horizontal strata being termed plateaus of accumulation, while those which consist of folded and contorted strata are known as pluteaus of denudation. Plains are only less elevated plateaus. Some of these, as, for example, the wide alluvial plains and deltas of great rivers, owe their origin to accumulation. Others, again, consist of low-lying land, the level of which has been reduced during a protracted period of denudation. Should such an area eventually be elevated it would become a plateau of denudation.

Speculative Geology.—There are certain great playing a problem of the section of

Speculative Geology.—There are certain great physical problems the data for solving which are more or less incomplete, or in the very nature of things beyond our knowledge. Amongst such is the question of the age of the sun's heat. This, of course, is rather a physical than a geological question, and yet geology furnishes evidence on the subject which the physicist cannot ignore. Some

physicists are of opinion that the sun's heat is due to gravitation—that, as Sir W. Thomson remarks, the sun's matter, before it came together and became hot, may have existed in the condition of two cool solid bodies which collided with the velocity due to their mutual gravitation. If gravitation, therefore, be the only source of the sun's heat, that luminary cannot have been giving out heat at the present rate of radiation for a longer peried than 20,000,000 years, or, as Professor Tait maintains, 10,000,000 years. But no geologist will admit that all the changes that have taken place on the earth's surface since the first appearance of life can possibly he included within such narrow limits. According to Dr Croll, however, the sun probably originated from the collision of two bodies moving directly towards each other with velocities greater than the relocities due to their mutual gravitation. As the heat generated by the impact of two such bodies would depend upon the velocity possessed by each before collision took place, it is obvious that the energy stored up in our sun may be infinitely greater than that which could have been derived from gravitation alone. So far, therefore, as a possible source of the sun's energy is concerned, Dr Croll is of opinion that life might quite well have begun 100,000,000 years ago.

Condition of the Earth's Interior.—This is another

physical problem in the solution of which geology is necessarily interested. Several views have been advanced by physicists, the more generally received opinion being that the earth is a more or less solid Others favour the hypothesis of a thin ernst enclosing a liquid or viscous interior; while yet others think that a liquid substratum separates the ernst from a solid nucleus. The appearance of volcances and thermal springs shows us that a high temperature exists beneath the crust, and similar evidence of internal heat is furnished by borings and mines. The mean of many observations shows that temperature increases 1° F, for every 54 feet of decount of the 15 Hz temperature. of descent, so that if the temperature at the surface be 50°, the boiling point of water (212°) will be reached at the depth of about a mile and a half. It is evident, therefore, that at a comparatively short distance from the surface the host would be sufficient (at atmospheric pressure) to welt all kinds of minoral matter with which we are acquainted. It is supposed, however, by those who maintain that the earth is solid throughout, that the substance of the earth's interior is kept from liquefying by pressure. So far as geological facts go they are opposed to the view of a solid globe or of an enormously thick crust. The felding and contortion of strate seem to imply the presence of an underlying yielding mass upon which the solid crust may have a certain freedom to move during the shrinking and contraction that must result from the secular cooling of the earth (see Earth, Mountains).

The origin of volcanic action has also been a much-canvassed question, and is variously explained.

nuch-canvassed question, and is variously explained according as the hypothesis of a solid or of a viscous interior is held to be the more probable (see VOLGANDES). Closely connected with such problems is that of the origin of vecavic busins and continental areas. Of late years the belief has gained ground that these dominant features of the earth's surface are of primeval antiquity—that in their origin they antedate the oldest of the sedimentary formations. It is a remarkable fact that hitherto, amongst the various formations that enter into the composition of the land of the globe, no trace of any abysmal accumulations has been met with. On the contrary, the aqueous rocks appear to have been deposited as a rule in relatively shallow seas. Many oscillations of level have taken place at successive periods within each continental area, by which the extent and outline

GEOLOGY

of the land have been again and again modified, but the great continental ridges, according to the geological evidence, would appear to have persisted from the earliest times as dominant elevations of the earth's crust. 'The continents,' as Professor Dana remarks, 'have never changed places with the oceans.' See ABYSMAL ACCUMULATIONS.

the oceans. See Abysmal Accumulations.

Changes of Climate.—The geological record every. where bears testimony to the fact that the climate of the globe has from time to time undergone changes. In our day climate is differentiated into zones; there is a marked change in the temperature as we pass from the equator to the poles. Latitude, and the relative positions of the great land and water areas, are doubtless the chief factors in the determination of the present climates of the globe, and must have had a similar influence on the climate of much older periods. Sir Charles Lyell and others have held, therefore, that such climatic vicissitudes as we have evidence of in the fossiliferons strata were we have evidence of in the fossiliterous strata were probably induced by changes in the distribution of land and sea. Others have doubted whether this will explain the facts. If it be true that the great continental ridges are of primeval antiquity, then continents and seas could not have changed places, as Lyell supposed. The climatic conditions of the Glacial Period (q.v.) cannot possibly be due to such revolutions, for the distribution of land and sea during Pleistocene times was practically the sea during l'leistocene times was practically the same as at present. Stated briefly, the facts of geological climate are these: In Pakrozoie ages the climate would appear to have been singularly the chimate would appear to have been singularly genial and uniform over the globe. All through Mesozoic times similar genial conditions seem to have extended from what are now temperate up to polar regions. But the evidence indicates apparently that the climate of the latter was somewhat less genial than that of more southern latitudes. In Cainozoic ages, likewise, the climate continued to be mild even in high Arctic lands, but towards the close of the Tertiary era a general lowering of the temperature took place. Thereafter followed the Quaternary period with its extraordinary climatic changes (see GLACIAL PERIOD, PLEISTOCENE SYSTEM). It is possible, as some suppose, that the uniform climates of the earlier real-mine. that the uniform climates of the earlier geological periods may have been due in part to the former greater heat of the carth. But probably the chief factor was the peculiar disposition of land and water. The continental areas appear for long ages to have been represented by groups of larger and smaller islands—a condition of things which would allow of the more or less free eirculation of oceanic currents round the world, Under such conditions atmospheric temperature and pressure would have a very different distribution from the present. It can hardly be doubted, also, that cosmical causes must have had some influence upon former climates. Croll believes that the strongly contrasted climates of the Pleistocene period (glacial and interglacial epochs) were the indirect result of increased eccentricity of the earth's orbit combined with the preceding of the carth's orbit combined. with the precession of the equinox. It has been objected to this theory that we have no evidence in the older geological periods of such remarkable climatic changes, which, if the theory be true, ought to have happened again and again during preceding periods of high eccentricity of the orbit. We are not, however, without evidence of ice-action in Pakrozoic, Mesozoic, and Cainozoic times. The evidence is not abundant, but, considering the conditions of sedimentation, it is perhaps as much as could have been expected. the street of the street of the arrangement of land and water in our homisphere at any period anterior to later Cainozoic times could have favoured such enormous accumulations of snow

and ice as those of the Pleistocene. When the continents were represented by groups of islands, the conditions for the massing of such great ice-fields could not have existed. And, if it be true that the climate of the globe in the earliest geological ages was influenced by the greater internal heat of the earth, the effects flowing from great eccentricity of the orbit might often be modified or neutralised.

Among the many subjects connected with geology which have separate articles assigned to them in this work, not to speak of the sections on the geology of Europe, Asia, Africa, America, Australia, and the several countries, are the following:

Abysmal Accumulations,
Archean System,
Artesian Wells,
Astr.
Boulder-elay,
Cambran System,
Carboniferous System,
Caves,
Goal,
Coral Islands,
Gretaceous System,
Denudation,
Dislocations,
Drift,
Barthquakes,
Eocene System,
Fossils,
Glacial Period,
Joints,
Jurassie System,
Lakes,
Landslips,

Mctamorphism.
Minoralogy.
Miocene System.
Monutains.
Necks, Voleanic,
Old Red Sandstone.
Ollgocene System.
Ore Deposits.
Palkrontology.
Peat.
Permian System
Petrography.
Pleastocene System.
Pilocene System.
Pilocene System.
Silurian System.
Silurian System.
Silurian System.
Stanta.
Triassic System.
Unconformity.
Uphaval and Depression.
Volcanoes.

Juransie System.
Landslips.

See, for General Geology, Lyell's Principles of Geology (1876); De la Beele's Geological Observer (1858); Lyell's Elements of Geology (1805); A. Geikie's Text-book of Geology (1887); Prestwich's Geology (2 vols. 1886-88); Phillips' Geology, edited by Etheridge and Seeley (2 vols. 1885); Green's Physical Geology (1882). The following are less elaborate treatises: Lyell's Student's Elements of Geology (1885); A. Geikie's Outlines of Geology (1888). The following are less elaborate treatises: Lyell's Student's Elements of Geology (1885); J. Geikie's Outlines of Geology (1888); Jukes-Brown's Handbook of Geology (2 vols. 1884-86); Pago and Lapworth, Introductory Text-book of Geology (1888). Of American and continental text-books may be mentioned: Dann's Manual of Geology (1875); Le Conte's Compend of Geology (1884); Credner's Elemente der Geologie (1887); Naumann's Lehrbuch der Geognosie (3 vols. 1858-72); Allgemeine Erdkunde, by Hann, Von Hoolstetter, and Pokonny (1881); De Lapparent's Truité de Géologie (1884); Stoppani'a Corso di Geologia (1871). Huttor's Theory of the Earth (1795) is interesting as containing the groundwork of the modern system of geology. See halpafair's Illustrations of the Huttonian Theory (1822). Of works dealing with special branches of geology, See halpafair's Illustrations of the Huttonian Theory (1822). Of works dealing with special branches of geology. See heat, in Popular Lectures and Addresses (vol. i. 1889); Croll's Climate and Time (1875), Climate and Cosmology (1885), and Stellar Evolution (1889). For Petrographical Geology, see references under Petrographical Observations on Volcances (1861); Rand J. W. Mallet's Earthquake Cutalogue (1858); Milne's Earthquakes (1856); Freibe's Volcances (1861); Rand J. W. Mallet's Earthquake Cutalogue (1858); Milne's Earthquakes (1852); Freibe's Transis through the Alps (1843), and Occasional Papers on the Theory of Glacers (1849); Tyndall, The Chudiers of the Alps (1877); Darwin's Vegetable Mould and Earthwooms (1881)

consult the standard text-books of geology; see also article STRATA. For Experimental Geology, see Daubrée's Etudes Synthetiques de Geologie Expérimentale (1879). consult the standard text-books of geology; see Daubree's Etudes Synthetiques de Geologie Expérimentale (1879). For works dealing with Palæontology, see under that article. For Physiographical Geology, see Memoirs of Geological Surveys of British Islands, passim; Ramsay's Physical Geopraphy and Geology of Great Britain (1878); A. Geikie's Secury and Geology of Great Britain (1878); A. Geikie's Secury and Geology of Fretaud (1878); Dutton's 'Tertary History of the Grand Calon District,' Monographs of U.S. Geol. Survey (vol. ii. 1882); also Annual Reports of U.S. Geol. and Geograph. Survey of Territories (1867-78), passim; De la Nov and De Margerie, Les Formes du Tirrain (1885). For Geology of British Islands, see Maps and Memoirs of the Geological Survey; works by Ramsay, A. Geokie, and Hull already cited; Woodward's Geology of England and Wales (1887); Kimahan's Geology of Ireland (1878); Murchison's Siluria (1867); Macculloch's Western Islands of Scolland (1819); Nicol's Guide to the Geology of Scolland (1841)—these last two works rather out of date; Miller's Old Red Sandstone (1858); Green, Miall, and others, Coal: its History and Uses (1878); Hull's Coalfields of Great Britain (1881); Meade's Coula and Iron Industries of the United Kinedom (1882); Phillips' Geology of Oxford and the Valley of the Thames (1871), and Geology of the Yorkshire Coast (1875); Tate and Blake, The Yorkshire Lias (1876). For further references to treatises dealing with the geology of England and Wales, see especially Woodward's work cited above. The following works deal with Pleistocene Geology and the Antiquity of Man: Lyel's Antiquity of Man (1873); Lubbock's Prehistoric Times (1878); Evans' Ancient Stone Implements of Great Britain (1872); Dawkins' Cave-huntiny (1874), and Early Man in Britain (1880); J. Geikie's Great Ice Age (1877), and Prehistoric Europe (1881); Dawson, The Earth and Man (1887); De Quatrefages, The Human Species (1879); Joly's Man before Metals (1883); Penck's Die Vergletscherung der deutschen Alpen (1883); Pen

Geometry. See Divination.

Geometrical Mean of two numbers is that number the square of which is equal to the product of the two numbers; thus, the geometrical mean of 9 and 16 is 12, for $9 \times 16 = 144 = 12^{\circ}$. Hence the geometrical mean of two numbers is found by multiplying the two numbers together, and extracting the square root of the product.

Geometrical Progression. quantities is said to be in geometrical progression when the ratio of each term to the preceding is the same for all the terms-i.e. when any term is equal to the product of the preceding term and a factor which is the same throughout the series. This constant ratio or factor is termed the common ratio. For example, the numbers 2, 4, 8, 16, &c., and also the terms u, ar, ar^3 , ar^3 , &c., are both examples of geometrical progression or series. The sum of such a series is obtained as follows : Let a be the first term, n the number of the terms whose be the first term, n the number of the terms whose sun, s, is required, and let r be the common ratio. Then $s = a + ar + ar^2 + \dots + ar^{n-1}$; also from multiplication of both sides of this equation by r, $sr = ar + ar^2 + ar^3 + \dots + ar^n$. Subtraction of the former from the latter expression gives $sr - s = ar^n - a$; or $s(r-1) = a(r^n - 1)$, and hence $s = \frac{a(r^n - 1)}{r - 1}$.

Geometry is that branch of the science of mathematics which treats of the properties of space. When the properties investigated relate to figures described or supposed to be described on space of two dimensions, there arise such subdivisions as plane and spherical geometry, according to the surface on which the figures are drawn. If the properties relate to figures in space of three dimensions they fall under what is called solid geometry. or now more frequently, geometry of three dimensions. Again, from the mode in which the properties of figured space are investigated, arise two other subdivisions, pure and analytical geometry.
The somewhat arbitrary subdivision into elementary and higher geometry arises from the fact that the geometrical books of Euclid's celebrated work, the Elements, treated only of plane figures composed of straight lines and circles, of solid figures with plane faces, and of the three round bodies, the sphere, the cylinder, and the conc.

Other subdivisions of geometry arise from the threefold elassification that may be made of the properties of space. These properties may be topological, graphical, metrical. The first class of properties are independent of the magnitude or the form of the elements of a figure, and depend only on the relative situation of these elements. on the relative situation of these elements. Perhaps the simplest example that could be given of this class of properties is that if two closed contours of any size or shape traverse one another, they must do so an even number of times. No systematic treatise on this part of geometry has ever heen drawn up, and it is only in papers scattered here and there in scientific journals that contributions towards such a treatise are to be found. The principal names under which such contributions are to be looked for are Euler, Gauss, Listing, Kirkman,

The graphical or projective properties of space, which constitute the subject of projective geometry, are those which have no reference to measurement, and which imply only the notions of a straight line and a plane. A simple example of this class of properties is the well-known theorem of Desargues: If two triangles be situated so that the straight lines joining corresponding vertices are concurrent, the points of intersection of corresponding sides are collinear, and conversely.

The metrical properties of space are those which are concerned with measurement. An example of a metrical property is the theorem of the three squares: The square on the hypotenuse of a rightangled triangle is equal to the sum of the squares on the two sides. The geometry of Euclid's Elements is metrical.

Descriptive geometry is not so much a part of science as an art. It has for its object to represent on a plane which possesses only two dimensions, length and breadth, the form and position in space of bodies which have three dimensions, length, breadth, and height. This object is attained by the method of projections.

Analytical geometry is a method of representing curves and curved surfaces by means of equations. Before showing, however, how a enryc can be represented by an equation, it

will be necessary to explain what is x meant by the coordinates of a point.

If two axes, XX',
YY', cutting each
other perpendicularly be taken, the position of a
point P in the same plane as the axes is determined,

if we know the distances of P from XX' and YY'—i.e. if we know MP and OM. OM is called the abscissa, MP the ordinate of the point P, and the two together are called the co-ordinates of P. It is usual to denote OM and MP by x and y. If the point P be supposed to move in the plane according to some law, a certain relation will exist between its co-ordinates; this relation expressed in an equation will be the equation to the curve traced ont by P. To take a simple example. Let the law according to which P moves be that its distance from XX' shall always he double its distance from YY'; then the equation to the curve traced out by P will be y = 2x. If it be required to draw the curve traced out by P, we may assume any values for x, and from the equation determine the corresponding values for y. If we assume the values 1, 2, 3, &c. for x, the corresponding values of y will he 2, 4, 6, &c. Determine then the points whose co-ordinates are 1 and 2, 2 and 4, 3 and 6, &c.; these will be points on the curve. It is not difficult to discover that the envec is in this instance a straight line.

If the law according to which P moves in the plane be that it shall always be at the same distance from a fixed point, we have only to specify the distance (say e), and the eo-ordinates of the fixed point (say e and e), and we shall find the equation which expresses this law to be

$$(x-a)^2 + (y-b)^2 = c^3.$$

If the distance he c, and the fixed point he the origin O whose eo ordinates are 0 and 0, the equation will be

$$x^2 + y^2 = c^2.$$

These last two equations are those of a circle.

As two eo-ordinates are sufficient to determine a point in a plane, so a plane curve described according to a certain law will be represented by an equation between two variables, x and y; viz. F(x,y) = 0. It may be mentioned that equations of the lirst degree represent straight lines, those of the second degree represent some form of a conic section, those of higher degrees represent enves which in general take their name from the degree of their equations. The position of a point in space is fixed when its distances from three planes, usually taken perpendicular to each other, are known; in other words, three co-ordinates x, y, z determine a point in space. Hence, if a curved surface is given in firm and position, and we can express algebraically one of its characteristic properties, and obtain a relation F(x, y, z) = 0 between the co-ordinates of each of its points, this equation is the equation of the surface; and every equation F(x, y, z) = 0, whose variables x, y, z are the co-ordinates of a point referred to three planes, perpendicular or ablique to each other, represents some surface, the form of which depends on the way in which the variables are combined with each other and with certain constant quantities.

The system of co-ordinates explained above is called the Cartesian, from Descartes. There are other systems, but a concise account of them would be unintelligible.

Of the history of geometry only the briefest outline can be given here, and this outline must be restricted mainly to pure geometry. Tradition ascribes (and modern research tends to confirm rather than to invalidate the ascription) the origin of geometry to the Egyptians, who were compelled to invent it in order to restore the landmarks effaced by the inundation of the Nile, but our knowledge of their attainments is meagre. From a papyrus in the British Muscum written by Ahmes, possibly about 1700 B.C., we infer that the Egyptians discussed only particular numerical

problems, such as the measurements of certain areas and solids, and were little acquainted with general theorems. The history of geometry, therefore, as a branch of science begins with Thales of Miletus (640-542 B.C.). The principal discovery attributed to him is the theorem that the sides of attributed to find is the theorem that the states of mutually equiangular triangles are proportional. After Thales came Pythagoras of Samos (born about 580 s.c.). It is difficult to separate the contributions which Pythagoras made to geometry from those of his disciples, for everything was ascribed to the master. The Pythagoreans appear to have been acquainted with most of the theorems which form Euclid's first two hooks with the which form Euclid's first two hooks, with the doctrine of proportion at least as applied to commensurable magnitudes, with the construction of the regular solids, and to have combined arithmetic with geometry. The theorem of the three squares, one of the most useful in the whole range of geometry, is known as the theorem of Pythagoras. Hippoerates of Chios, who reduced the problem of the duplication of the cube to that of linding two mean proportionals between two given straight lines; Arehytas of Tarentum, who was the first to duplicate the enbe; Endoxus of Cnidus, the inventor of the method of exhaustions and the founder of the doctrine of proportion given in Euclid's fifth hook; Mencelmus, the discoverer of the three conic sections; Deinostratus and Niconadas, the inventors of the conductive and Niconedes, the inventors of the quadratrix and the concluid; and Aristans, are the principal predecessors of Euclid. To Euclid (about 300 n.c.) is due the form in which elementary geometry has been learnt for many conturies, and his treatise, the Elements, seems to have completely superseded all preceding writings on this subject. Those books of this treatise which are concerned with geometry are so well known that it is superfluous to refer to their contents. Archimedes of Syracuse (287-212 B.C.) is the greatest name in Greek science. Besides his important contributions to statics and hydrostatics, he wrote on the measurement of the circle, on the quadrature of the parabola, on the sphere and cylinder, on conoids Apollonius of Perga (200-200 B.c.) wrote on several geometrical subjects, but the work which procured him in his lifetime the title of 'the great geometer,' was his treatise on the conic sections. Ptolemy, anthor of the Almagest, Hero, and Pappus are the last important geometers belonging to the Alexandrian school.

After the destruction of Alexandria (about 640 A.D.) the study of geometry underwent a long eclipse. The Romans contributed nothing either to geometrical or indeed to any kind of mathematical discovery. The Hindus from the 6th to the 12th century A.D. cultivated arithmetic, algebra, and trigonometry, but in geometry they produced nothing of any importance. A somewhat similar statement may be made regarding the Arals, but it ought to be remembered that they translated the works of the great Greek geometers, and it was through them that mathematical science was in the 12th century introduced into western Europe. From that time till the close of the 16th century, though editions of the Greek geometers were published and commented on, little or no advance was made in geometry comparable to what took place in other branches of pure or applied mathematics.

In the beginning of the 17th century Kepler

In the beginning of the 17th century Kepler and Desargues hald the foundations of modern pure geometry, the former by his enunciation of the principle of continuity, and by his extension of stereometry to solids of which the spheroids and conoids of Archimedes were particular cases, the latter by his introduction of the method of

projection. In 1637 Descartes gave to the world his invention of analytical geometry, thus placing in the hands of mathematicians one of the most powerful instruments of research, and withdrawing their attention from pure geometry. Pascal (1623-62), whose extraordinary precedity has often been cited, wrote an essay on conic sections at the age of sixteen. He afterwards wrote a complete work, one of the properties of which is the theorem of the mystic hexagram. His last work was on the cycloid. With the mere mention of the mass of Wallis, Fernat, Barrow, Huygens, we pass to Newton, whose great work, the Principia, is the glory of science. Chasles thinks Newton's best title to fame is that he has raised such a monument of his genins by the methods and with the resources of the geometry of the ancients. The names of Halley, Maclantin, Robert'Simson, and Enler bring us down to near the end of the 18th century. During the 19th century a revival of interest in pure geometry has been brought about by Monge, the inventor of descriptive geometry, by Carnot, the author of the theory of transversals, by Poncelet and Gergonne, These have been succeeded by Möbius, Steiner, Chasles, and Von Stault.

Chasles, and Von Staudt.

The best works on the history of Greek Geometry are Allman's Greek Geometry from Thales to Euclid (1839); Paul Tannery's La Géométrie Greeque (1887); Bretschneider's Die Geometrie und die Geometre vor Euklides (1870). Chasles's Aperçu historique sur l'Origine et le Déreloppement des méthodes en Géométrie (1837 or 1875) and his Rapport sur le Progrès de la Géométrie (1870) embrace the whole field of Geometry. The following more general histories may also be consulted: Canton's Vorlesungen über Geschichte der Mathematik (1880); Hoefer's Histoire des Mathématiques (1874); Marie's Histoire des Siciences Mathématiques (1874); Marie's Histoire des Siciences Mathématiques (1874); Marie's Histoire des Siciences Mathématiques (1802); Gow's Short History of Greek Mathématiques (1894); and Ball's Short Account of the History of Muthematics (1884); and Ball's Short Account of the History of Muthematics (1888).

George, a division of the western province of Cape Colony, on the south coast, east of Capetown. It contains 2000 sq. m., and about 11,000 inhabitants. It is valuable chiefly for its pasturage and its timber. The town of George stands 6 miles N. of the coast, and has a population of over 2000. On the coast is the port of Mossel Bay.

George, St, the especial patron of chivalry, and tutclary saint of England. Although venerated both in the Eastern and Western churches, his history is extremely obscure, the extant accounts containing very much less history than legend. The story in the Acta Sauctorum is that he was born of noble Christian parents in Cappadocia, became a distinguished soldier, and, after testifying to his faith before Dioeletian, was tortured and put to death at Nicomedia, April 23, 303. By many writers, as by Gibbon, he has been confounded with the turbulent and unscrippilons Arian partisan, George of Cappadocia, who after a troubled life as army contractor and tax-gatherer became Archbishop of Alexandria, and after five years of misgovernment was torn in pieces by a furious mob. Most authorities, Catholic and Protestant, agree in admitting the great improbability of this identification. Or Peter Heylin is of one mind in this matter with the Jesuit Papebroch, and Dean Milman with the Roman Catholic Bishop Milner. Whatever may be said of the unhistorical character of St George's martyrdom, the fact of his being honoured as a martyr by the Catholic Church, of churches being dedicated to him, and of the Hellesport being called 'St George's Arm,' is traced by Papebroch, by Milner, and by other writers to so early a date, and brought so immediately into contact with the times of the angry conflicts in which George of Cappadocia figured as an Arian leader, that it is impossible to believe

that the Catholies of the East—while the tomb of Athanasius was hardly closed upon his honoured relies—would accept as a sainted martyr his ernel and masempulous persecutor. The St George of the Eastern Church was no doubt a real personage of an earlier date than George of Cappadocia, but beyond this we can say nothing of him. His name was early observed in fable—one oriental story making him suffer as many as seven martyrdoms, reviving after each save the last. The same story exists even in Mussulman legends, whose Chwolson identifies the hero with the Semitic Tammuz.

The famous story of St George's struggle with the dragon is first found in Voragine's Legenda Aurca, but soon found its way into the office-books of the church, until left out by Pope Clement VII. To slay a dragon was a common exploit for the saints and heroes of Christendom as well as of Tentonic and Indian antiquity; and St George here touches so closely the common myths of the Aryan family as to have himself been explained, by Baring-Gould and others, as in this aspect merely a mythical form of the sun-god dispelling

the darkness by his beams of light.

Churches were dedicated to St George from very early times; the Crusades gave a great impetus to his worship, and he was adopted as the soldiersaint who led his votaries to battle. Many new chivalrons orders assumed him as their patron, and he was adopted as their tutelary saint by Eugland, Aragon, and Portugal. In 1348 Edward III. founded St George's Chapel, Windsor, and in 1344 the celebrated Order of the Garter was instituted. See Baring-Gould's Curious Myths of the Middle Ages, and the article Dr. Gon.—The cross of St George, red on a white ground, was worn as a badge over the armour by every English soldier in the 14th and subsequent centuries. For the hamer of St George, now represented in the Union flag, see Flag.

George 1. son of Ernest Augustus, Elector of Hanover, and of Sophia, grunddaughter of James I. of England, was born in Hanover on 28th May 1660. Immediately after Queen Anne's death on 1st August 1714, he was proclaimed king of Great Britain and of heland in London, the proclamation at Edinburgh taking place four days, and at Dublin live days later. He had been Elector of Hanover since 1608, and he was the first monarch of the House of Brunswick who, in accordance with the Act of Settlement, succeeded to the throne of this country. He arrived at Greenwich on 29th September, and was crowned at Westminster on 31st October 1714. He had commanded the imperial forces in the war against France in which Marlborough acquired distinction, and, though less successful than Marlborough as a general, he was as chagrined as he when the Tory party, under the inspiration of Bolingbroke, made peace, and sanctioned the treaty of Utrecht. In 1682 he married his cousin, the Princess Dorothea of Zell. Twelve years later he obtained a divorce on the ground of her intrigue with Count Königsmark, and caused her to be imprisoned in the eastle of Ahlden, where she died on 2d November 1726. While punishing his consort for her frailty, he lived openly with mistresses, and was neither ashamed of his conduct nor made to suffer for it.

The Tories and Jacobites who ching to the banished House of Sthart were the objects of his aversion, and the Whigs were favoured by him. Bolinghroke and the Duke of Ormond fled to France; both of them, and Oxford, who remained behind, were impeached. In Scotland a Jacobite rising, headed by the Earl of Mar, took place in 1715; a battle at Sheriffmuir on the 13th November, though indecisive, dispirited the rebels, who afterwards dispersed. Another body marched

into England, proclaimed James king at Pemith, and, being surrounded after reaching Preston, laid down their arms on the day of the lattle at Sheriffmin. The Earl of Derwentwater and Viscount Kennture were executed on Tower Hill; many others were shot, and many were transported. A year after this abortive rebellion, parliament passed the Septennial Act, in order that by prolonging its own existence for four years the accession of the Tories to power might be hindered. More serious than any rebellion was the rise and fall of the South Sea Company (q.v.), the English counterpart of the Mississippi Scheme which beggared France. The king's personal part in the history of the reign was but slight, the actual ruler being Sir Robert Walpole. George I. could not speak English; Lord Granville was tho only one of his ministers who could converse with him in German; the king and Walpole interchanged views in bad Latin. On this account the king did not preside at meeting of the cabinet. Queen Anne is the last sovereign of Great Britain who was present at a cabinet council. It was the delight of George I, to live as much as possible in Hanover, and to obtain as much money as possible from Great Britain. He died suddenly at Osnabrück, on his return from Hanover, on 9th June 1727. Lady Wortley Montagu styles George I, 'an honest blockhead.' If he had been an abler man he might have proved a worse sovereign. He was a useful ligure head in a constitutional government, and rendered greater service than he may have intended to the country which adopted him.

See the Histories of England by Stanhope, Hallam, and Lecky; the Staart Papers; the Life of Walpole, by Coxe; the Historical Register.

George II. succeeded his father as Elector of Hanover and king of Great Britain and of Ireland. Born in Hanover on 30th Octoher 1683, he was created Duke of Cambridge in 1706, and declared Prince of Wales in council in 1714. In 1705 he married Caroline of Anspach, a woman of many attainments and great force of character. She exorcised great influence over her husband, and winked at his infidelities. When on her deathbed in November 1737 she implored him to marry again, he replied, with tears in his eyes, that he would rather keep a mistress. Though George interfered more in the government than his father had done, the policy pursued during his reign was first that of Walpole and second that of Pltt. During the greater part of Walpole's administration of the government peace was preserved; during the period that Pitt was almost supreme wars were fought and much glory was gained. In 1743 George II. was present and showed courage at the battle of Dettingen, the last occasion this on which an English sovereign has played a part in actual warfare. The rebellion in 1745 was ended at Culloden, where the adherents of the Young Pretender made their last stand. The Pretender had defeated General Cope at Prestonpans, and marched as far as Derby before succumbing to the royal forces under the command of the king's second son, the Duke of Cumberland, whose cruelty in dealing with the rebels caused him to be stigmatised as 'the Butcher.' The country prospered so well that in 1749 the funds rose above par. Pelham, the Chancellor of the Exchequer, effected a saving by reducing the interest on the national debt from 4 to 3½, and then to 3 per cent. Among the victories which made this reign glorious was that of Clive at Plassey and that of Wolfe at Quebec. The earlier years of the reign are pronounced by Hallam to be 'the most prosperous season that England had ever experienced,' George II. died suddenly on 25th October 1760. He had no conspicuous virtues. He may be credited, however, with a few pointed sayings.

One was, 'What a strange country is this! I have never known but two or three men in it who understood foreign affairs.' Another was, 'Confidence is a plant of slow growth in an aged bosom.'

See the Histories of England by Stanhope and by Lecky; Memoirs of the Reign of George II., by Harvey; Dodington's Diary; and Horace Walpole's Memoirs of the last Ten Years of the Reign of George II.

George III. was the eldest son of Frederick Lewis, Prince of Wales, and was born in London, at Norfolk Honse, St James's Square, on 4th June 1738. Being a seven-months' child, and very weakly, the boy was not expected to survive, and sate eleven at night he was privately baptised by Dr Secker, who was Bishop of Oxford and rector of the parish of St James. On 2d July the hishop per-formed the ceremony publicly, the boy being named George William Frederick, and his sponsors being the King of Sweden, the Duke of Saxe-Gotha, and the Queen of Prussia. On 25th October 1700 George II. died suddenly, and his grandson ascended the throne. The new king was the first member of the House of Brunswick who commanded general respeet on becoming the sovereign over Great Britain and Ireland. At the same time he became Elector of Hanover, a title which was exchanged for that of king in 1815, when he was incapucitated for performing his duties, and unconscious of what passed in the world. He was the only one of the four Georges who never visited his German dominions. In his first speech to parliament he said: 'Born and educated in this country, I glory in the payer of Evitor, and the reculier heaviers. in the name of Briton, and the peculiar happiness of my life will ever consist in promoting the welfare of a people whose loyalty and warm affection to me I consider the greatest and most permanent security of my throne.' These words were inserted by himself in the speech composed by the Earl of Hardwicke and approved by the ministry. At the ontset George III. conciliated all classes of his subjects. Horaec Walpole thus describes from personal observation the nature of the change: 'For the king himself, he seems all good nature and wishing to satisfy everybody. All his speeches are obliging. I saw him yesterday, and was surprised to find the leveroom had lost so entirely the air of the lion's den. The sovereign does not stand in one spot with his eyes fixed royally on the ground, and dropping bits of German news. He walks about and speaks freely to everybody. I saw him afterwards on the throne, where he is graceful and genteel, sits with dignity, and reads his addresses well. On 8th September 1761 he married Charlotte Sophia, Princess of Mecklenburg-Strelitz, his bride being in her eighteenth and he in his twenty-third year. A fortnight after their marriage they were crowned. As a younger man he was supposed to have had children by Hannah Lightfoot, a beautiful Quakeress, and to have married her, but no warf of this associate the court have a supposed to have been expected. proof of this marriage has ever been advanced. It is less open to doubt that, after ascending the throne, he wished to marry Lady Sarah Lennox, and that his mother used her influence to bring about a marriage with one who, like herself, was a German princess.

George III. owed it to his mother that he was strongly inbred with a desire to govern as well as reign. 'George, be king,' was the phrase which she repeated, and the training which he had received made him give heed to it. Bolingbroke, in writing the Idea of a Patriot King, had the expectation of persuading Frederick, Prince of Walos, and father of George III., to act the part. The substance of Bolingbroke's teaching was that a king should be the father of his people, that he was the man best qualified to know what would be for their good, and the one best entitled to make them do as he deemed right. Thus George III. felt certain that

his own way was the true one, and that were it followed all would go well. The friction which followed all would go well. soon became manifest between him and his people was chiefly due to his determination to have his own way. Pitt was the popular idol; but the king disliked Pitt and his policy, and the Earl of Bute became prime-minister in the place of the Duke of Newcastle. It was commonly helicved that Bute was both the favourite of the king and the lover of his mother; he was a Scottish nobleman who dispensed patronage to his countrymen, and he was execrated on account of his birth, his position, and his conduct. If he had been a strong man, he might have justified his promotion, but, being both timid and incompetent, he succumbed to popular clanour. His premiership lasted from May 1762 till April 1763. George Grenville, his successor, was premier for two years. The Marquis of Rockingham, who followed him, held the office for eleven worths. months, the Earl of Chatham for fourteen mouths, These short-lived administrations were due to the king pitting one section of the Whig party against the other, in order to escape falling under the domination of the great Whig families, the result being that a party was formed which was known as 'the king's friends.' George III. found in Lord North a minister after his own heart, and Lord North remained at the head of the government from January 1770 till March 1782. During the administration of Lord North the thirteen united colonies proclaimed and achieved their independence, and were acknowledged by France and Spain as the United States of America. The determination of the king not to grant any concessions to those whom he deemed rebels caused the struggle to be protracted, and slint the door against compromise while compromise was possible. The subserviency while compromise was possible. The subserviency of parliament and the acquiescence of the country enabled the king to have his own way. Lord North was succeeded by the Marquis of Rockingham, Lord North who died after he had been three months in office. Among his colleagues were Charles James Burke, and Sheridan, three of the most brilliant members of the Opposition, and three men whom George III. detested. Lord Shelburne, who was a member of the same administration, took Rockingham's place, but the colleagues just named and others refused to serve with him; on the other hand, he secured the services of William Pitt as Chancellor of the Exchequer. The friends of Charles James Fox and the followers of Lord North coalesced, and overthrew the Shelburne administration after it had been ten months in office; and the Duke of Portland became the head of a coalition ministry which entered office in April 1783, and was compelled to leave it, owing to the underland action of the king, in December of that year. In the interval the definitive treaty of peace with the United States of America was signed, and the India Bill was brought before parliament, a measure of which Burke was the chief author, Fox the warm

advocate, and George III. the irreconcilable foe.

In December 1783 William Pitt, then in his twenty-fourth year, formed an administration in which he was Chancellor of the Exchequer as well as First Lord of the Treasnry, and he remained in office for eighteen years. The crushing victory of his party at the general election in 1784 was a triumph for the king as much as for Pitt. From that date there was an end to the supremacy of the old Whig families. The Tory party bad been consolidated and was prepared to give effect to the policy of George III. The struggle had been long and severe. John Wilkes had taken part in it, and by his audacious resistance he had led to the abolition of general warrants. The writer whose letters were signed Junius had denounced the ministers whom the king trusted,

and had warned the king himself that, as his title to the crown 'was acquired by one revolution, it may be lost by another.' That popular feeling ran high against the sovereign for a time is unquestionable, yet he gradually regained the affections of his subjects; hence, when it was announced in 1788 that he had lost his reason, there was a widespread sympathy with him. His eldest son had displayed vices from which he was free, and the people did not think the substitution of the Prince of Wales for the king would be a gain to the country. years before a mad woman, named Margaret Nicholson, had tried to stab the king, and the addresses of congratulation upon his escape then showed how general was the popular feeling. In 1765 he had an illness lasting two months, in which his reason was affected. On his recovery at that time there was April 1789, he went to St Paul's to render thanks for his recovery. The Prince of Wales, who had counted upon becoming regent, openly displayed ill-humour at his father's reception. A proof of public feeling was that a play in which Mrs Siddons took a leading part had to be withdrawn from the stage after one representation, because it here the obnoxious name of 'The Regent.' The marriage of this son to Princess Caroline of Brunsmarriage of this son to Princess Caroline of Bringswick gave the king much gratification. It took place on 8th April 1794. Three years later the Princess Royal became the wife of the hereditary Prince of Wurtemberg. The king's second son, the Duke of York, had married the eldest daughter of Frederick II. of Prussia in 1791. George III. had a barro family, it much and prince as a barro family. large family; it numbered nine sons and six daughters, the first child, the Prince of Wales, being horn in 1762, and the last, the Princess Amelia, in 1783. The king had no fear of his children acting like his brother, the Duke of Camberland, when he mar-ried Mrs Horton, or like the Duke of Gloucester, when he married the Countess of Waldegrave. The Royal Marriage Act, which was passed at his instance in 1772, forbade the members of the royal family marrying without the consent of the sovereign, if under twenty-five, or doing so after that age unless a twelvementh's notice had been given to the Privy-council, and parliament had not

given to the Privy-conneil, and pariament and not expressed disapprobation within that period.

Though George III. was averse to war, he was strongly in favour of restoring the Bourbons to the throne of France. When the union between Ireland and Great Britain was proposed he wrote to Pitt characterising it as one of the most useful measures of his reign; but when the union was effected, and Pitt proposed carrying out his pledges with regard to the emancipation of the Roman Catholics and the endowment of the Roman Catholic priests, the king refused his assent, saying, as Lord Eldon records, 'I can quit my palace and live in a cottage; I can lay my head on a block and lose my life; but I can not break my coronation oath.' Pitt resigned; George III. refused his advice to form a strong administration, including Fox. The king's batted of Fox amounted to mania; he wrongfully attributed the bad conduct of the Prince of Wales to association with the great Whig leader. Hence the king entrusted Addington with the task of forming an administration, which held office till war with France was renewed, and the necessity for a firmer hand at the helm was apparent. Pitt resuned the office of premier, and died in 1806. A ministry was formed on 5th March 1806, in which Fox and Sidmonth held office, and of which Lord Grenville was the head; it was reconstituted after Fox's death on 13th September in that year, and it was succeeded in 1807 by one of which the Duke of Portland was the head, and in which Perceval was Chancellor of the

Exchequer, and Canning a secretary of state. In 1809 Perceval succeeded to the premiership, and this was the last administration in forming which George III. had any share. His jubilee was celebrated amid popular rejoicings on the 25th October 1809. In 1810 Princess Amelia, his youngest and favourite child, became dangerously ill; the unlikelihood of her recovery preyed upon him and hastened an attack of mental derangement, which incapacitated him for reigning. He had suffered from this malady more than once since 1789. In 1810 the Prince of Wales was appointed regent. Till his death, on 29th January 1820, at Windsor Castle (he was the first English king who died there), George III. was hopelessly insane. He lost his sight as well as his senses.

Though not a drop of English blood ran in his veins, yet George III. was a typical Englishman. He was well-meaning and intensely patriotic; he was truly pious and a pattern of the domestic virtues. His reign was marked by many vicissitudes, and it extended over sixty years. Decisive battles in America, India, and Europe were fought during its course, and many grand conquests were achieved. Great statesmen, such as Chatham, Pitt, and Fox, adorned it; great captains, such as Nelson and Wellington, made their names immortal; the greatest names in modern English literature then rose above the horizon; parliamentary oratory was at its zenith, and nothing was wanting to render the reign the most glorions in the country's annals but greater discretion on the part of the king. If George III. had been a little less of the typical Englishman, he might have been a more admirable sovereign. It was chiefly owing to his prejudices being respected by those who ought to have opposed them that war took the place of conciliation in America, and that war was prosecuted against France, when the iuwar was prosection against 1 10.30, 11.10 teres of the country demanded neutrality among the continent. When the contending powers on the Continent. When George III. ascended the throne the national debt, in round numbers, was £138,000,000 sterling; before his death it was upwards of £800,000,000. On the other hand, the trade and commerce of the country made gigantic strides during his reign. At his accession the exports did not exceed £12,000,000 sterling; at his death they were upwards of £50,000,000. The imports between that period rose from £8,000,000 to £36,000,000 sterling. At the beginning of the last forty years of his reign the number of newspapers in the three kingdoms was 61; at his death the number was 222. Several years before he died the Times newspaper was printed by steam, and the foundations of the daily press as it now exists were laid in the reign of a sovereign who was no favourer of newspapers. greatest of his misfortunes was to be the father of the eldest son who succeeded him, and it is when George IV. is considered that the merits of George III. become the more conspicuous, and that 'Farmer George,' as he was familiarly called during his lifetime, appears a nobler figure in history than the 'First Gentleman in Europe,' as his eldest sou was styled.

See the histories of England by Stanhope, Massey, Martineau, and Lecky; the Mimoirs and Letters of H. Walpole; the Grenville Pupers; the Chatham, Rockingham, Bedford, Auckland, and Malmeshury Correspondence; the Letters of George III. to Lord North; Burko's Works; the Letters of Juntus; the Annual Register; and The Opposition under George III., by Fraser Rae.

George IV., the eldest son of George III., was born in St James's Palace on 12th August 1762. He became Prince Regent in December 1810, after both houses of parliament had passed resolutions to the effect that the king was mentally incapacitated for discharging the duties of his office. He ascended the throne of the United Kingdom of

Great Britain and Ireland after his father's death on 29th January 1820. Till the age of nineteen the prince was kept under striet discipline, against which he sometimes rebelled. When he was fourteen one of his tutors resigned on the ground of 'the ungovernable temper of his charge.' The Bishop of Lichfield, who then became his preceptor, gave the following forecast of the Prince of Wales: He will be either the most polished gentleman or the most accomplished blackgnard in Enrope; possibly an admixture of both. At the age of eighteen the prince had an intrigue with Mrs Robinson, an actress, who obtained from him a bond for £20,000, and letters which she threatened to make public; she surrendered the letters for £5000, and the bond in return for an anunity of £400. When twenty he went through the ceremony of mar-riage with Mrs Fitzherbert (q.v.), a Roman Catholic, and by so doing forfeited his title to the crown. When the matter was mooted in the Honse of Commons, he desired Fox to deny there had been a marriage, and then he found fault with Fox for making the statement. Late in life he said to Lady Spencer, when consulting her about a goverher to tell the truth. You know that I don't speak the truth, and my brothers don't, and I find speak the truth, and my brothers don't, and I find it a great defect from which I would have my daughter free. We have been brought up badly, the queen having taught us to equivocate.' The prince led a wild life. Ont of antagonism to his father he affected to be a Whig, and associated with the leading members of the Opposition. When a lad he annoyed his father by shouting in his presence, 'Wilkes and Number 45 for ever!' When writing about his eldest son to Lord North, the king styled him an 'ilk-advised young man,' and much of the king's aversion to Fox, Burke, and Sheridan was due to their associating with and Sheridan was due to their associating with and advising the Prince of Wales. In 1795 he married Princess Caroline (q.v.) of Brunswick, being induced to do so by parliament agreeing to pay his debts, which amounted to £650,000. The prince had shown himself an undutiful son; he now showed himself to be a bad husband; and his conduct to his daughter and only child, the Princess Charlotte (q.v.), was that of a callous father. After becoming king he endeavoured to get a divorce from his wife, who was not more guilty than himself of conjugal crimes; but her death on 7th August 1821 terminated a struggle which on 7th August 1821 terminated a struggle which had become a public scandal, and in which the people sympathised with the queen. Nothing in the reign of George IV. was more remarkable than his coronation, which was celebrated with as great pomp as that of any previous monarch, and with far greater splendour than that of William IV. or Queen Victoria. It took place on 19th July 1821, and it was described in the Edinburgh Weekly Journal by one who signed himself 'An Eyewitness,' and who was Sir Walter Scott. Eleven days after his coronation the king left London for days after his coronation the king left London for Ireland, while his queen lay on her deathbed. In the Irish Avater, Byron writes of 'George the triumphant' speeding 'to the long-cherished isle which he loved like his—bride.' In October of the same year he went to Hanover, and was crowned king. He stopped at Brussels on the way and visited Waterloo, the Duke of Wellington aetand visited Waterloo, the Duke of Wellington aeting as his guide. In August 1822 he went to Edinbrigh ly water, where he had a magnificent reception, of which Sir Walter Scott was the organiser. The last king who had visited Scotland before him was Charles II. Though a professed Whig when Prince of Wales, George IV. governed as his father had done by the aid of the Tories. Spencer Perceval, Lord Liverpool, Canning, Viscount Goderich, and the Duke of Wellington successively held office

as premiers while he was regent and king. The movement for reform which began in the reign of movement for reform which began in the reign of George III. was opposed, with the king's concurrence, by the advisers of George IV., the massacre at Peterloo, where the inhabitants of Manchester held a reform meeting on 20th August 1820, being the most regrettable of many sad incidents. On this occasion the open-air meeting was charged by cavalry and yeomanry, with the result that oleven persons were killed and about six hundred wounded. On the ground of his reli-gious convictions, George IV. followed his father in opposing the emancipation of the Roman Catholics; but in 1829, when the Duke of Wellington declared that the measure was imperative, the king withdrew his opposition and the measure became law. His failings and vices were conspicuous; it cannot be said that they were wholly redeemed by his taste for music, by having a good voice for singing, and by playing fairly on the flute. It was creditable to him that he read and admired the inimitable romances of Jane Ansten and Sir Walter Scott. Yet he did not adorn the throne, and when he died on 26th January 1830, he was least regretted by those who knew him best. See Justin M Carthy, A History of the Four Georges (4 vols. 1889 et segg.).

George V., of Hanover. See HANOVER.

George ('the Bearded'), Duke of Saxony (q.v.). George, Henry, was born in Philadelphia, September 2, 1830, went to sea at an early age, and in 1838 arrived in California, Copyright 1870 in U.S. where he became a journeyman by J. B. Lippineott printer and married. After a number of years spent at the case, he rose to the editivity of the season of the case. torial desk, conducted several papers, and took an active part in the discussion of public questions. In 1870 he published Our Land and Land Policy, a 1870 he published Our Land and Land Policy, a pamphlet outlining the views which have since made him widely known, but which had only a local circulation. In October 1870 appeared Progress and Poverty in California. In January 1880 it was published in New York, and in 1881 in London and Berlin. It has since gone through many editions, been translated into the principal languages, and had a circulation without precedent in economic literature. Progress and Poverty is an inquiry into the cause of industrial depressions, and of the increase of want with increase of wealth, in the course of which some of the most important in the course of which some of the most important of the hitherto accepted doctrines of political economy are recast. Denying the dictum that wages are limited by capital, he argues that wages are produced by the labour for which they are paid, and, denying the Malthusian theory, he contends that increase of population instead of cansing want should tend to greater plenty. Then, by an examination of the laws of distribution, in which the laws of wages and interest are shown to cor-relate with the hitherto accepted law of rent, he comes to the conclusion that, as produce equals rent plus wages plus interest, therefore produce, minus rent, equals wages plus interest. The increase of economic tent or land values explains why the increase of productive power so marked in modern civilisation does not commensurately increase wages and interest. To the tendoncy of the steady increase in land values to beget speculation in land, which prevents the application of labour and capital, he traces the recurring seasons of industrial depression. The remedy he proposes is the appropriation of accompany part to milliourous have the residual. of economic rent to public uses by a tax levied on the value of land exclusive of improvements, and the abolition of all taxes which fall upon industry and thrift. Meeting objections which may be urged against this proposition on the ground of justice and public policy, he finally brings it to a

larger test in an examination of the law of human larger test in an examination of the law of numan progress, which he defines to be that of association in equality. George has since written The Irish Land Question (1881), Social Problems (1882), Protection and Free Trade (1886). He visited Great Britain and Ireland in 1881, 1883, 1884, 1888, and 1889, speaking extensively through the country in support of his views. In 1886 he ran for mayor of New York as an independent candidate nominated by the working wear receiving over 68 000. nated by the working-men, receiving over 68,000 votes, and forcing the two powerful factions of the democracy into a coalition to prevent his success. In 1888 he as a free-trader supported Mr Cleveland. In 1887 George established a weekly paper in New York called the Standard. Though sometimes York called the Standard. Though sometimes styled a socialist, George's views are for the most part diametrically opposed to state socialism. His aim is to sweep away all restrictions and interferences with the production and distribution of wealth, and only to resort to state control where competition is impossible—to leave to individuals all that individual energy or their economiates and to take for the use of the thrift accumulates, and to take for the use of the community all that is due to the general growth and improvement.

George, LAKE, called also Horicon, a beautiful lake, 32 miles long, near the eastern border of New York state. It forms the head-waters of Lake Champlain, is studded with hundreds of picturesque islands, and its shores contain several favourite summer-resorts, especially the village of Caldwell or Lake George. Hore was fought the battle of Lake George, in which the French and Algonius water Reven Dieskan were uttarly defeated. quins under Baron Dieskan were utterly defeated by the English and Iroquois under Sir William Johnson, on 8th September 1755.

George, THE, the badge of the Order of the Garter (q.v.).

Georgetown, a port of entry in the District of Columbia, is situated, partly on several eminences, on the Potomac, two miles above Washington, at the head of navigation. The heights are occupied by elegant villas, and command a fine view of the country around. Here the Chesapeake and Ohio Canal is carried across the Potomac by means of a great viaduct 1446 feet long. The city contains a number of educational institutions, including a Roman Catholic college (1789); and its many flour-mills enjoy a wide reputation. For its administration, see DISTRICT OF COLUMBIA. Pop. (1880) 12,578; (1885) 14,322.

Georgetown (formerly the Dutch Stabrock), capital of British Guiana, is situated on the right bank of the Demerara River, not far from its mouth. It is handsomely built, and consists of wide, clean streets, intersecting at right angles; the brightly painted wooden houses, with their Swiss eaves developed into handsome verandahs, are generally raised on piles a few feet above the unhealthy soil, and embosomed in trees, of which the cabbage-palm and cocoa-nut are the chief. Some of the streets, with their long colonnades of palms, are traversed by wide trenches or canals, with bridges at the cross streets. The principal public bridges at the cross streets. The principal parallel edifices are the government building, the cathedral, the Queen's College, and a museum and library. There are botanical gardens, several hospitals, an icchouse, and two markets. Water for ordinary purposes is supplied from a canal, the mains boing laid through most of the principal streets; and artesian wells, besides tanks for the storage of rain, have to some extent supplied the lack of drinking-water. There is a short railway to drinking-water. Mahaica, and a telephone exchange has been established in connection with the government telegraph system. There is a good harbour, with a lighthouse, and defences erected within recent

years; the foreign trade is virtually that of the colony (see GUIANA, BRITISH). Pop. (1881) 47,175, including many coolies, and scarcely 5000

Georgia, the most southerly of the original thirteen states which composed the American Tennessee, North Carolina, and South Carolina; E. by the Savan-Company. South Caronna; E. by the Savanmali River, which separates it from South Carolina, and by the Atlantic Ocean; S. by the St
Mary River and Florida; and W. by the Chattaloochee River and Alabama. It lies between 30°
31′ 39″ and 35° N. lat., and in 81°—85° 53′ 38″
W. long., and has a maximum length and breadth
of 320 and 256 miles, and an area of 59,475 sq. m.—
a little more than the area of England and Wales.

Linon the Atlantic Ocean it from for a distance Upon the Atlantic Ocean it fronts for a distance of 128 miles; but the coast, low-lying and sandy, is bordered with islands, between which and the mainland are a number of sounds and creeks; so that the total coast-line is said to be about 480

The territory of Georgia presents five physical divisions: (1) The Sea Islands, famous for their cotton (see COTTON), and covered with a growth of oak, palmetto, magnolia, cedar, pine, and myrtle; (2) the Swamp Region, consisting of rich alluvial lands and deltas, formed by the fresh-water rivers, verdant with a dense and semi-tropical vegetation, and admirably adapted to the production of rice; (3) the Pine Barrens, with a thin soil, lying between the rate parrens, with a time sort, typing between these marsh grounds and the undulating red-clay lands of the interior, sheltered by vast forests of pitch-pine, which are highly prized as lumber and for naval purposes, but lonely and monotonous; (4) Middle Georgia, fertile, salubrious, hilly, crowned with forests of oak and hickory, the home of the short-staple cotton-plant, a fine fruit region, and yielding Indian corn, oats, wheat, and other cereals; and lastly (5) Cherokeo Georgia, abounding in mountains, with fertile valleys, streams, and waterfalls. Cereals, grasses, and cotton are profitably grown among the valleys and upon the hillsides of Upper Georgia; and increasing attention is being bestowed upon the breeding of stook. In the contral area of the last. breeding of stock. In the central area of the lastmentioned division occurs the watershed, giving direction to the streams which flow respectively into the Gulf of Mexico on the one hand, and into the Atlantic Ocean on the other. The entire state is well watered. Of the rivers emptying into the Atlantic Ocean the most noteworthy are the Savannah, navigable as far as Augusta; the Great Ogeechee; the Altamaha, through its tributaries the Oconee and the Ocumlgee navigable as high as Milledgeville and Macon; the Satilla; and the St Mary. The streams belonging to the Gulf system are the upper waters of the Coosa; the Chattahoochee, navigable as far as Columbus; the Flint, navigable up to Albany; and the Alapaha.

With the exception of the swamp-region in the south and south-east of the state, the climate is salubrious and agreeable. The mean temperature is 78° in summer and 47° in winter; the annual rainfall nearly 50 inches. In the lowlands oranges and other semi-tropical fruits readily mature, whilst in the uplands peaches, apples, pears, &c. flourish; and fruits and market vegetables generally, being earlier than in the North, are exported in considerable quantities. The forests exported in considerable quantities. The forests contain numcrous species of oak, including the evergreen live-oak, which has been styled the king, as the Magnolia grandiflora has been styled the queen of the southern woods. Of great value is the long-leaf pine, furnishing both choice timber and naval stores. The list of useful native woods includes also the red, the white, and the post oak,

the water-oak, the black walnut, the red cedar, the cypress, the poplar, and the locust. Among the indigenous flora are found valuable medicinal herbs and dye-plants; and the flowers often are of great heanty. Game is still abundant, in spite of the injury resulting from the failure to cnact and enforce stringent laws for its preservation. Seafowl throng the coast and estuaries, alligators are numerous in the rivers, and food-fishes, oysters, clans, turtle, &c. are abundant. By reason of the denudation of their banks, rendering their waters turbid and causing unruly currents, the fresh-water streams lave suffered material diminutive law their streams lave suffered material diminution in their animal life. From them food fishes, once so abundant, have largely disappeared, and the pearl-bearing unio is now seldom seen; but the United States Fish Commission has been successful in the introduction of some varieties of fishes

better suited to the changed condition.

The mineral wealth of Georgia is apparent in the gold-bearing strata of the Cherokee region, which for the past fifty years have been successfully worked, in extensive deposits of coal, in iron, mity worked, in excensive deposits of coal, in non, copper, silver, and lead ores, in marbles of attractive varieties, in vast fields of granite and slate, and in the presence of gypsum, limestone, syenite, marl, bulinstone, sompstone, asbestos, shales, tripoli, fluor-spar, kaolin, elays, porcelain, aragonite, tournaline, emerald, carnelian, ruby, opal, the leaders against a country of the lea chalcedony, agate, amethyst, jasper, garnets, rose-quartz, beryl, and occasional diamonds. In 1837-64 the United States branch mint at Dahlonega coined gold bullion to the value of over six million dollars, mostly from metals extracted from the auriferous rocks of the adjacent territory. To the development of these mineral resources of the state much attention is being paid, and with profitable results. Prior to the civil war the inhabitants of Georgia were almost exclusively engaged in agriculture and commerce; but more recent industries are the lumber trade, and extensive cotton, woollen, and other manufactures. The most important mills are at Augusta, Columbus, Atlanta, Atlens, and Roswell. Recent statistics show that there are now within the state 54 cotton and woollen mills, with 350,000 spindles and 8000 looms; while the lumber, flour, grist, and pulp mills, &c. are being multiplied, and the iron and steel trade in the north-western part of the state is overtaking the cotton manufacture in import-

Although, since the civil war, the production of black-seed cotton on the sca islands and along the coast has materially diminished, the yield of short-staple cotton has greatly increased. The average crop of this variety will now approximate 1,000,000 bales, worth at the point of consumption or of export over \$40,000,000. Of the other yearly agricultural products of Georgia the rice crop (25,000,000 pounds), the Indian corn (25,000,000 pounds), the Indian corn (25,000,000 pounds) agriculture care system agriculture and talegoes. the indian corn (25,000,000 bushels), wheat, oats, sweet potatoes, and tobaceo are important; and there is a yearly yield of 600,000 gallons of syrup, 650 hogsheads of canesugar, 5,000,000 pounds of butter, and 700,000 pounds of honey. From the ports of Savannah, Darien, Brunswick, and St Mary shipments of lumber and naval stores are annually increasing. Navigable rivers and an admirable system of railways (over 3000 miles), besides three short canals, furnish convenient transportation from the interior. Notably at Sayannah, coastwise and foreign bound steamers and sailing-vessels convey the products of the region to the desirable markets of

The state is divided into 137 counties, 10 congressional districts, 1 supreme judicial district, 21 judicial circuits, and numerous militia districts. Atlanta is the capital, and Savannah the commercial

GEORGIA 164

Augusta, Macon, Columbus, and metropolis. Matter of the second through the thriving cities and towns of this commonwealth. The population has steadily increased from 82,548 in 1790 to (1860) 1,057,286; (1870) 1,184,109; (1880) 1,542,180. It is now estimated to exceed 1,750,000, of whom the

whites form slightly more than half.
There exists in Georgia a thorough system of There exists in Georgia a thorongi system of free common schools; separate schools are conducted for both white and coloured pupils. Opportunities for higher education are afforded by the university of Georgia, at Athens, by its dependent colleges at Dahlonega, Milledgeville, Thomasville, Cuthbert, and Atlanta, and by sundry the conjustional colleges. denominational colleges. At the university of Georgia and its dependent colleges tuition for Georgians is free. Georgia has also a school for the blind at Macon, for the education of the deaf and dnmb at Cave Spring, and an asylum for lunatics

dumb at Cave Spring, and an asylum for lunatics near Milledgeville.

History.—The colony of Georgia was founded by James Oglethorpe (q.v.) in 1733, as a refuge for poor debtors and for the persecuted Protestants of George II. In 1752 Oglethorpe surrendered his charter to the British government. Georgia was thereafter classed as an English province, until, with her sister colonies, she succeeded in casting off her allegiance to the crown. Save during the few years of the civil war, she has since continued a component member of the confederation of the United States of America, and has long been component member of the confederation of the United States of America, and has long been regarded as the Empire State of the South. Despite the liberation of her slave population, which in 1860 numbered 450,033, and was valued at \$302,694,855, and in the face of grievous losses occasioned by the war, the state has during the last quarter of a century manifested recuperative powers of a marvellous sort.

powers of a marvellous sort.

Georgia, the name formerly applied to the central portion of what is now Russian Transcaucasia (q.v.), bounded by the Caucasian mountains on the north and by the Armenian mountains on the south. The Russian name is Gruzia; the Persian Gurjestan, from which form the name Georgia probably arose, it being perhaps a corruption of Guria, the name of one of the western provinces. The early history of the Georgians, who pretend to trace their origin to Thargamos, a great-grandson of Japhet, is wrapped in fable. Mtskethos, who is said to have built Mtsketha, the ancient capital of the country, situated near Tiflis, but now reduced to a mere village, plays a prominent part in it. We have also to deal with legend in the story of the Argonauts and Medea, who is said to have been born at Kutais. The who is said to have been born at Kutais. Georgians first appear in authentic history in the time of Alexander the Great, to whom they submitted. After the death of Alexander in 323 B.C. they gained their independence under Pharnavas (302-237 B.C.). With Pharnavas begins the series of the kings (a title rendered in Georgian by the word mephe), who, under various dynasties, ruled the country almost uninterruptedly for more than 2000 years. In 265 A.D. the Sassanian dynasty ascended the throne in the person of King Marian, and ended with Bakour III, in 570. Towards the close of the 4th century Christianity was introduced by the preaching of St Nina, and in 469 Vakhtang built the city of Tiffis (Tbilisi), so called from the hot-springs found there. Soon after the death of Mohammed his followers entered the country and forced may not the inhabitants to the country and forced many of the inhabitants to the country and forced many of the liminocants to embrace Islam. The Sassanides were succeeded by the powerful dynasty of the Bagratides, one of whom, Bagrat III. (980-1008), extended his dominions from the Black Sea to the Caspian; but during the eleventh century the Georgians twice

suffered from an invasion of the Seljuks, who committed great devastations.

The country reached the height of its glory in the reign of Queen Thamar or Tamara (1184-1212), the daughter of George III. With her marriage to the son of the Russian prince, Andrew Bogo-liulski, may be said to begin the connection be-tween Russia and Georgia. The dominions of Tamara were more extensive than those of any other native sovereign, and her court was graced by the presence of many men of letters. But evil days were in store for Georgia. In 1220 and 1222 we hear of Mongolian invasions, and Tiflis was harried with fire and sword. Towards the end of the 14th century the country fell into the hands of Timour, who, however, was driven from it in 1403 by George VII. One of George's successors, Alexander (1413-42), committed the fatal error of dividing the kingdom between his three sons. The general history of Georgia now separates into two parts: that of the castern states, Karthli and Kakheth, and that of the western states, including Imereth, Mingrelia, and Guria. From the 16th to the 18th century the Georgians suffered grievously from the Persians. In 1618 Shah Abbas invaded the country, and Teimuraz I. applied for help to the Czar Michael; in 1638 Levan, king of Mingrelia, took the oath of allegiance to Alexis; it was only from their co-religionists that the Georgians could hope for succour in their hour of need. They also suffered from the encroachments of the Turks. suffered from the encroachments of the Turks. In 1795 the savage Aga Mohammed Shah invaded Georgia, and levelled Tillis to the ground, carrying away a great number of captives. The aged king Heraclius II., an able sovereign, seeing that all resistance was in vain, fled to the unountains, where he soon afterwards died. His son, George XIII., resigned the crown in favour of Paul, emperor of Russia, in 1799; but his brother Alexander did not acquiesce in this arrangement, and held out for some time, but was defeated in a Arexander and not acquiesce in this arrangement, and held out for some time, but was defeated in a battle on the banks of the Ior. George died in 1800, and in the following year Alexander of Russia formally annexed the country. In 1810 the prince of Interest attempted a revolt, which was quickly suppressed. Guria was finally united with Russia in 1829.

The former kingley of Cooxide is presented.

The former kingdom of Georgia is mainly included in the governments of Kutais, Tillis, and Elizabethpol. The district is very fertile, being abundantly productive of cereals, winc—especially the Kakhetian—honey, and silk, of cattle and horses, while the mountains teem with mineral wealth, as yet little utilised. The Georgians belong to the Kartvell stock, forming the southern group of Caucasian peoples. Their numbers have been variously estimated. Some fix them at about 911,000, but Von Erckert (Der Kaukusus und seine Volker, Leip. 1887) gives the following calculation, as based in the main on the last census of 1881:

Georgiaus (in	the rest	ricted s	ense of th	e term)	850,000
Imeretians a	nd Guria:	ns			480,000
Adcharians a	nd Lazes				20,000
Pshaves, ltvi	ng in the	mounts	ins	,	9,000
Thushes	10	11			0,000
Khevsurs	**	11			7,000
Mingrelians.					215,000
Scanetians					13,000
				_	
				1	.100.000

To this work is appended an excellent ethnological map. The Georgians and their congeners are of the Caucasian or Fair race (as opposed to the Mongolian or Yellow race). They are celebrated for their beanty, and under the Mohammedan rule the white slaves of western Asia and of Egypt were mostly drawn from among them and the Circassians. To the great credit of Russia this

GEORGIA 165

disgraceful traffic was put an end to by the treaty of Kuchuk-Kainardji in 1774. Though endowed by nature with mental no less than physical advantages, the long course of oppression to which they have been subjected has had its effect upon their characters. But, despite the supremacy and brutal tyranny of their Mohammedan conquerors, they have as a nation remained faithful to the Christian religion, according to the doctrines of the Greek Church. In Guria, however, and the country of the Lazes, large numbers of the inhabitants were forced by persecution to embrace Islam, and in these districts the ruins of many churches may still be seen. The southern Caneasians, with magnificent physique, fertile soil, and enervating climate, are somewhat indolent; they are passionately fond of singing and music.

The four chief tongues—Georgian, Mingrelian,

Suanctian, and Lazian, which some have called the Iberian group—stand to each other more in the Iberian group—stand to each other more in the relation of languages than dialects, although they certainly all had a common origin; Mingrelian especially has greatly diverged. Georgian alone of the four has a literature, if we except the few folk-tales of the Mingrelians. These languages are of the agglutinative type; the chief difficulty like in the contractive the contractive the contractive that the contractive the contractive that the contractive the contractive that the contractive lies in the verbs, which incorporate the pronominal prefixes and suffixes. In their structure they resemble Basque, but no affinity can be established between these two families of languages, as their

vocabularies have no word in common.

The Georgians use two alphabets—the khutsuri or ecclesiastical, and the mkhchruli or civil: the first is only employed in the religious books. They are very old, and legendary accounts are given of their origin. The ecclesiastical resembles the Armenian alphabet; the civil is a very pretty character, with many rounded letters, which make it somewhat resemble Burmese. Georgian literature is by no means poor. Professor Tagarelli gives a list of 946 Georgian MSS. known to exist; they are preserved in monasteries at Jerusalem, on Mount Athos and Mount Sinai, and at Tiflis, in the library of the Society for the Diffusion of Education among the Georgians. Besides these, there are 36 MSS in the Bibliothèque Nationale in Paris, and 34 in private hands at Tiflis. Further search will no doubt bring to light others. As force if and 34 in private hands at Tiflis. Further search will, no doubt, bring to light others. As far as it can be traced back, the literature begins about the 5th century A.D., with translations of the Scriptures and the Fathers, and later on we get versions of the Greek classical authors, including Plato, Aristotle, and Josephus. To the 7th century belongs a fine psalter on papyrus, and there is a complete mannscript of the Bible of the 10th, preserved at Mount Athos. The great literary development, however, of the country was during the 11th and 12th centuries, and especially in the reign of Queen Tamara. To this period belongs the papular epic, 'The Man in the Panther's Skin' (Vephkhvis-tkaosani), a poem narrating the love (Vephkhvis tkaosani), a poem narrating the love of Avtandil for Tinatina, daughter of the Arabian king Rostevan, and that of Tariel for Nestan Darking Rostevan, and that of Tariel for Nestan Dar-edjan, daughter of the Indian king Parsadan. It is a richly-coloured work, as if written by an oriental Tasso, and enjoys great popularity among the Georgians at the present day, many of the couplets—it is written in quatrains—having passed into proverbs. The author, Shota Rustaveli, was the glory of the reign of Queen Tamara, and is said to have died at Jerusalom as a monk in 1215. A handsome illustrated edition of this work an A handsome illustrated edition of this work appeared at Tiflis in 1888. Of Shavtel, another poet of the time who also enjoyed considerable reputation, only a few odes have come down. Cliakhrukhadze composed a long and rather tedions poem in honour of the famous queen; prose tales were written by Sarkis of Thuogvi, the most celebrated

being the Visramiani, and a poem by Mose of Khoni, ealled Duredjaniani. Now that the Georgians have been secured by Russian protection from their Moslem foes, they are busy in studying their old literature and editing their MSS. Somewhere about the same time as these authors flourished was begun the Georgian chronicle, called Karthlis Tskhovreba, or life of Georgia, the first part of which is anonymous, and carries the history from the earliest times to the year 1224; a continuation, also anonymous, brings it down to the

year 1445.

But this brilliant period was destined to a temporary eclipse; during the 14th and the next two centuries the country was a prey to Mongols, Tartars, Persians, and Turks; the cities were devastated, many of the inhabitants were carried into captivity, and valuable MSS. were lost or destroyed. In the 17th century, however, matters began to mend. Towards the close flourished Saba Sulkhan Orbeliani, one of the most learned men of his time, who visited Paris, where he was well received by Louis XIV., and Rome. To him his countrymen are indebted for the first dictionary of their language, called, in oriental style, 'The Bouquet of Words;' it was edited at Tiflis in 1884. His also was the popular work, 'The Book of Wisdom and Falsehood' (Tsigni Sibrmne-sitsruisa), a collection of amusing fables and apologues, some of his own invention, and others drawn from the stores of Georgian and other oriental folk-tales. A Russian translation of this interesting book has been published by Professor Tsagarelli of St Peters-

burg.
In 1709 King Vakhtang VI. established a printing-press at Tillis. One of the works which appeared was 'The Man in the Panther's Skin,' to which he added a curious mystical commentary, giving the book a religious meaning, perhaps to rehabilitate it among the clergy, who regarded it as a profane work. Vakhtang also laboured at a translation of the Kalilah and Dannah, in which he was assisted by Sulkhan Orbeliani (edited at Tillis in 1886). This king, thinking his country lost on account of a fresh invasion of the Turks, emigrated to Russia with many Georgian families, and in consequence of their presence in the country the great Georgian Bible was published at Moscow in 1743. To this century also belong the *Davithi-*ani, a poem by Guramishvili, and the first Georgian grammar, by the Catholicos (Primate) Anthony, besides other works. Vakhusht, the son of Vakhtang, continued the chronicle of his country till 1745, and wrote a geographical description of it, a work of tweet value of the chronic works. 1745, and wrote a geographical description of it, a work of great value. Since the peaceful settlement of Georgia under the Russians, literature has been greatly developed. The fine lyric poets, Alexander Chavehavadze (whose daughter married Griboiedov, the Russian dramatist), Raphael Eristavi, Nicholas Baratashvili, and Akaki Tsereteli, have appeared. The most conspicuous literary man of Tillis at the present time is Prince Ilya Chavehavadza author of some of the most grace. Chaveler like any author of some of the most graceful lyrics in the language, and some spirited tales in which he has satirised the luxury and other weaknesses of his countrymen. He is editor of the Georgian literary and political daily journal, Iberia. Some of the plays of Shakespeare, among others Humlet and Othello, have been translated by Prince Machabeli. Altogether, Georgian literature may be said to be in a flourishing condition.

The pioneer in the study of Georgian history and philology was Brosset, who published Eléments de la Langue Georgianne (Paris, 1837), an elaborate edition of the Georgian Chronicle (St. Petersburg, 1849-58), and many other works. Chubinov's Gruzinsko-russko-frantsuskii Slovar, Dictionnaire Georgian-français-russe (St. Petersburg, 1840), and Russian-Georgian Dictionary

(1846; new ed. 1886); Prof. A. Tsagarelli's Sciollinia o pamiatnikakh grucinskoi pismennosti (in Russian; 'Notices of the Monuments of Georgian Literature,' Anguess of the Monuments of Georgian Interature, part i. St Petersburg, 1886), and Mingrelskie Etiudi 'Mingrelian Studies' (St Petersburg, 1888); and A. Leist's Georgische Dichter verdeutscht (Leip. 1887) may be mentioned. See also Wardrop, The Kingdom of Georgia

Georgia, Gulf of, an arm of the Pacific, tween Vancouver's Island and the mainland of between Vancouver's Island and the mainland of British Columbia, communicating with the ocean by Queen Charlotte's Sound in the north, and by the Strait of Juan de Fuca in the south. exceeds 30 miles in breadth, and has a length of nearly 250 miles.

Georgian Bay. See HURON (LAKE).

Georgic. See Bucolic.

Georgswalde, a town on the northern border of Bohemia, 112 miles N. of Prague by rail, with a mineral spring, and linen manufactures. Pop. 5604.

Geplyrea, a class of un egmented marine worms, divided into two distinct sub-groups: (a) the Gephyreans proper, without bristles (G. achata)—e.g. Sipuncalus (q.v.), Priapulus, Phascolosoma; and (b) the Echiuroids or armed Gephyreans (G. chatifera)—e.g. Echiurus, Thalassema, Bonellia (q.v.). They live at the bottom of the sea, in sand, mind, or among rocks. While the adults of both sub-groups are not segmented, the larvie of the Echimoids are, and on this and other grounds many anthorities place them apart from the other Gephyreans and nearer the Annelids.

See Selenka, 'Gephyrea,' Challenger Rep. xiii. (1885); De Mace, Bülow, and Selenka, 'Die Sipunculiden,' in Semper's Reisen im Archipel der Philippinen, part ii. (1884); Rietsch, 'Monograph of Echiuridæ,' Recueil Zool. Suisse, iii. (1880).

Zool. Suisse, iii. (1886).

Gepidæ, a people of Germanic origin, whom we first read of as settled about the mouth of the Vistula in the 3d century. Before the 5th century they had migrated to the Lower Dannbe, where they were subjugated by the Huns; but, revolting against Attila's son, they recovered their freedom and established themselves in Dacia. There their power grew so great that they levied tribute from the Byzantine emperors down to Justinian's days. In the end of the 5th century a powerful enemy arose to them in the Ostrogoths; and after them came the Longobards, who, in alliance with the Avars, inflicted a crushing defeat upon the Gepidæ in 566. A part of the last-named then submitted to the Avars, whilst a part accompanied the Longoto the Avars, whilst a part accompanied the Longo-bards to Italy. Henceforward we hear of them no

Gera, a town of Germany, capital of the small principality of Reuss-Schleiz, is pleasantly situated on the White Elster, 42 miles E. by S. of Weimar by rail. Nearly destroyed by fire in 1780, it is for the most part a modern town, with broad and regular streets, but its older buildings include a castle and a fine town-hall. There are over a score of extensive woollen factories, besides cottonscore of extensive wooten factories, besides cotton-works, dyeing and printing works, manufactures of machinery, leather, tobacco, and heer for export, and four publishing houses; and eight establishments, employing 1500 hands, turn out thousands of melodeons, accordions, and jews'-harps yearly. Pop. (1843) 11,300; (1880) 27,118; (1885) 34,152, nearly all Protestants.

Gerace, a town of southern Italy, 4 miles from the sea, and 37 (58 by rail) NE. of Reggio. It has a cathedral, rebuilt after the earthquake of 1783, and a trade in wine, especially the esteemed Lucrima di Gerace. There are iron-mines and a hot sulphur-spring close by, and on a neighbouring plain are the ruins of the ancient Locri. Pop. 5265.

Gerando, Sec Degerando.

Geraniacere, an order of thalamifloral dicoty-ledons, herbs or undershrubs of temperate coun-Icions, herbs or undersinubs of temperate contries, particularly abundant at the Cape, and of which the leading genera Geranium, Pelargonium, and Erodium yield a great number of garden and greenhouse plants (see GERANIUM). In a wider sense the order is extended to include the closely related inter II internal and Savels (Outline) sense the order is extended to histine the closely related Lints (Linaceee) and Sorrels (Oxalidaceee), together with the curiously specialised Balsam-inaceee, and sometimes also the Tropscolaceee (see TROP. EOLUM), of which, however, the affinity is more doubtful.

Geranium, the typical genus of Geraniacene, which includes about 100 perennial and annual herbs. The popular name (Cranc's-bill) is derived from the resemblance to the erane's book prefrom the resemblance to the crane's beak presented by the beak-like process attached to the fruit, this enriously assists in the distribution of the seed by its characteristic mode of splitting spirally into awn-like processes and carrying the seed along with them. Twelve species are natives of the woods, hedgerows, and fields of Britain. Of these several are cultivated in gardens, especially de sanguineum, with its variety lancastriense, and the double-flowered form of G. sylvaticum, one of the handsomest of border flowers, while among pretty exotic species may be named G. armenum, platypetalum, &c. Several are of old medicinal



Herb Robert (Geranium Robertianum).

repute, notably G. Robertianum (Herh Robert or Stinking Crane's-bill), which emits a strong disagreeable odour that is said to banish bugs: it is indigenous in the United States. G. maculatum is the Aban Parkins Month Appaired. is the Alnin Root of North America—a root so powerfully astringent as to be employed, both by the Indians and the European settlers in the United States, in domestic medicine for many disorders requiring the exhibition of astringents. G. carolinianum is another American species. A or. carotimation is another American species. A few species produce edible tubers—e.g. G. tuberosum of South Europe, and G. parviflorum, the Native Carrot of Tasmania. The name Geranium is, however, often popularly misapplied to the members of the allied genus Pelargonium; witness the socalled 'searlet geranium,' 'ivy-leaved geranium,' See PELARGONIUM.

Gérard, ÉTIENNE MAURICE, COMTE, Marshal of France, was born at Damvilliers, in Lorraine, 4th April 1773. Volunteering into the army in 1791, he associated his fortunes for some years with those of Bernadotte, serving on the Rhine, in Italy, in the Vendéc campaign, in Germany, and in Spain, where he especially distinguished himself at Fuentes de Oñoro. For his brilliant services at Austerlitz (1805) he was appointed general of brigade; he also took a notable part at Jona (1806), Erfurt (1806), and Wagram (1809). During the Russian campaign of 1812 he rendered conspicuous service at the capture of Smolensk, in the battle of Valontina-Gora, and at the passage of the Beresina. After Napoleon's return from Elba he commanded a division at Ligny, and was wounded at Wavre. The second restoration compelled him to leave France, and he did not return till 1817. In 1831 he commanded the French army sent to the assistance of the Belgians against the Dutch, whom he drove out of Flanders, and on 27th December 1832 compelled the citadel of Antwerp to capitulate. After the July revolution of 1830 he was appointed marshal and war-minister by Louis-Philippe; he was again war-minister from July to October in 1834. He died at Paris, 17th April 1852.

Gérard, Baron François Pascai, painter, born of French parentage at Rome, 1th March 1770, at ten was brought to France, and at sixteen became the pupil of David. In 1795 he exhibited 'Belisarins,' which first brought him into notice; shortly afterwards he painted 'Psyche receiving the First Kiss from Cupid.' Previous to this he had already begun to work at portrait-painting, his portrait of Madame Bonaparte in 1790 being the beginning of his career as the 'painter of kings.' Almost all the royal and other celebrities who visited Paris between 1799 and 1837 were painted by Gérard, who owed his success not alone to his skill as a portraitist, but also to the charm of his manners and conversation. The grandest of his works are, however, historical pictures, the 'Battle of Austerlitz' (1810) and the 'Entry of Henry IV. into Paris' (1814). Gérard was appointed first court-painter and raised to the rank of baron by Louis XVIII. He died at Paris, 11th January 1837. Gérard's most celebrated portraits are those of Napoleon in his coronation robes, the Queen of Napoleon in his coronation Talleyrand, Taluna, Louis-Philippe, and Madame Récamier. See books by Adam (3 vols. 1852-57) and H. Gérard (1867).

Gerard, John, herbalist, was born at Nantwich, in Choshire, in 1545. Settling in London, he kept Lord Burghley's gardens for over twonty years, practised as a barber-surgeon, becoming master of the company in 1808, and died in 1612. His famons Herbult was published in 1597, mainly based upon the Stirpium Historice Pemptades (1583) by Rembert Dodoens. An enlarged edition of Gerard's Herbull was issued by Thomas Johnson in 1633.

Gérard, caricaturist. See GRANDVILLE.

Ger'asa, in the time of the Romans, a flourishing eity of Palestine, was situated among the mountains of Gilead, about 20 miles east of the Jordan. It is now deserving of notice solely on account of its ruins. Great portions of the eity wall are in good preservation; three of the gateways are almost perfect; two theatres and several temples can be identified amongst the public buildings; and within the city more than 230 columns are still standing on their pedestals.

Gerbert. See Sylvester II.

Gerhardt, Karl Fredrich, chemist, born at Strasburg, 21st Angust 1816, at fifteen was sent to the Polytechnic School of Carlsruhe, and afterwards studied chemistry at Leipzig, and under Liebig at Giessen. In 1838 he arrived in Paris, where he lectured on chemistry, and where with his friend Cahours he commenced his researches on the essential oils. In 1844 he was appointed professor of Chemistry at Montpellier. About this time he published his Précis de Chimie Organique, in which he sketches the idoa of 'Homologous and Heterologous Series.' In 1845-48, in association with Laurent, he published tho Comptes rendus des Travaux de Chimie. In 1848 he resigned his chair and returned to Paris in order to follow out unin-

terruptedly his special investigations; and in that city he established, between the years 1849 and 1855, in successive memoirs, his views of series and the theory of types with which his name is associated in the history of chemistry. It was there, also, that he gave to the scientific world his remarkable researches upon the anhydroms acids and the oxides. In 1855 he became professor of Chemistry at Strasburg. All his ideas and his discoveries are embodied in his Traité de Chimie Organique (4 vols. 1853-56). He had hardly completed the correction of the last proof of this great work, when, after an illness of only two days, he died on 19th August 1856. See the Life by his friend Cahours.

Gerhardt, Paul, perhaps the best writer of hymns that the German Lutheran church has produced, was born at Grifenhainichen, in Saxony, 12th March 1607, became dean at the church of St Nicholas in Berlin in 1637, but, in consequence of his opposition to the elector Frederick-William's attempt to bring about a mion of the Lutheran and Reformed chunches, was banished from Brandenburg in 1636. The last seven years of his life he was pastor of Libben, where he died, 6th June 1676. He wrote 123 hymns, all excellent, and many of them worthy to be placed amongst the choicest productions of Protestant sacred poetry. The one beginning 'Commit thou all thy ways' is well known in England from Wesley's translation. Other exquisitely tender lyries are 'Nun ruhen alle Wilder' (Now all the woods are sleeping), 'O Hampt voll Blut und Wunden' (O wonnded head and bleeding), 'Du bist zwar mein, und bleibest mein' (Thou'rt mine, yes, still thou art mine own).

Gerizim and Ebal, the two highest monutains in the central Palestine chain, celebrated in Scripture story. They are separated from each other by a deep narrow valley, in which stands the town of Nabulus, the ancient Sheehem, the metropolis of the Sanaritan sect. The tops are about 3000 feet above sca-level; both are of hard limestone, bare, and with cliffs on their sides. The valley between them is 1500 feet deep, very fertile, with springs and fruit gardens. Jacob's well stands where the valc joins the plain of Moreh. On the slope of Ebal to the north of the well is Syehar (now 'Askar). The view from the top of Mount Gerizim, the southern hill, embraces glimpses of the blue waters of the Mediterrancan on the west, with the plains of Sharon and Casarca, the snow-capped heights of Hermon on the north, and on the cast the plains of Moreh, and beyond the mountains of Gliead. Mount Gerizim, along with Mount Ebal, was the scene of a grand and impressive ceremony, in which the whole people of Israel took part after crossing the Jordan, in obedience to a command which Moses had given them (Dent. xxvii.). The half of the tribes standing on Gerizim responded to and affirmed the blessings, those on Ebal the enrese as pronounced by the Levites. The Sanaritans built a temple on Mount Gerizim as a rival to that of Jerusalem, and organised a rival priesthood; and the Sanaritan Pentateneh closed the Decalogue with the injunction, 'Thou shalt build a temple on Mount Gerizim, and there only shalt thou worship.' And, though the Sanaritan temple was destroyed by Hyreams about 200 years after, the mountain on which it stood continued to be held sacred by the Sanaritans. It was to Mount Gerizim that the 'woman of Sanaria' referred when she said to our Saviour: 'Our fathers worshipped in this mountain, and ye say that in Jerusalem is the place where men ought to worship.' Subsequently, a Christian church in honour of the Virgin was built on it.

Germ, a name applied to the egg-eell of plant or animal, either from the first or in its early

GERM 168

stages; but also used in reference to microorganisms associated with disease (see BACTERIA, c.). By 'germ-eells' the reproductive elements, cspecially the ova, are meant; while 'germ-plasma' is a very common modern word for the most essential parts of the nuclei in the reproductive cells. See EmbryoLogy, Herebity.

GERM THEORY OF DISEASE, as the name implies, seeks to find the explanation of certain well-recognised conditions of disease in the presence and action of specific living organisms within the affected body. Though comparatively recently introduced as an efficient working hypothesis in the investigation of some hitherto ill-understood pathological phenomena, the correctness of the theory is now generally admitted. The facts which it has aided in establishing and the numberless investigations which it has inspired have created an important department of medical science. The study of bacteriology (see BACTERIA) has awakened fiesh interest in almost every branch of medicine; and the subject possesses a large and extensive literature of its own.

The evolution of the theory was due mainly to two factors: (1) The discussions and investigations which circled round the process of fermentation; (2) the application of more perfect microscopical methods to the study of the lowest forms of plant

and animal life.

(1) The familiar process of Fermentation (q.v.) gave birth to much debate. The earlier chemists (Gay-Lussae, and more recently Liebig) held that fermentation was merely the result of the process of decay of organic matter. Various modifications of this doctrine, which cannot be considered here, were enunciated, but the general conclusion remained the same. On the other hand, so early as 1812, Appert had demonstrated from the practical side that organic substances capable of fermentation or putrefaction could be preserved intact if kept in closely stoppered bottles which were afterwards exclosely stoppered bottles which were afterwards exposed to the temperature of boiling water. In 1836 Caignard-Latour described an organism, the yeast plant, which he affirmed to be constantly present in the fermenting fluid. Its growth and reproduction he believed to proceed synchronously with the fermentation. Schwann (1837) described this organism independently, and Helmholtz (1843) confirmed the observation. They maintained that the process, in place of being a mere decomposition, was vital and depended on the presence of the organism they had discovered. This revolutionary doctrine was further elaborated pre-eminently by Pactors and her Schultz Schulet Schulet Franch by Pasteur and by Schultz, Schröder, Duseh, Lister, Tyndall, and others. Their researches showed that fermentation was caused by the presence of these organisms; that the exclusion of these from fluids capable of fermentation, by various methods of sterilisation and filtration of the air in which they were abundantly present, was sufficient to prevent its occurrence; that the doctrinc which attributed the production of fermentation to the influence of certain gases—e.g. oxygen (Gay-Lussac)—was erroneous; that the idea of the spontaneous generation (see Spontaneous GENERATION) of such organisms within properly sterilised and protected finids (Needham, Bastian, Pouchet, Huizinga) was fallacions; and that the so-called putrefaction was but one variety of fermentation.

(2) One result of these discussions was to develop a refinement of the methods of microscopical research, more especially with reference to the investigation of the lowest forms of life (see BAC-TERIA). Though bacteria had been recognised and described in the 17th century (Leeuwenhock), it is mainly to the rescarches of the latter half of the 19th century that we are indebted for an approach to an accurate knowledge of the life-history of these organisms. By the masterly labours of Cohn, De Bary, Zopf, Van Tieghem, Nageli, Klebs, Koch, and many others, the methods of demonstration have been improved to an extraordinary degree. elaboration of staining methods alone, in conjunction with the use of perfected lenses, has made possible the detection and examination of minute

organisms hitherto unrecognisable.

It is impossible to say when the idea of an analogy between the familiar phenomena of fermentation and those of acute disease first arose, It is certain that before the 19th century there had been prevalent an ill-defined feeling after somehad been prevalent an 11-defined feeling after some-thing of the kind. More than two hundred years ago Robert Boyle (1627-91), in his 'Essay on the Pathological Part of Physik,' clothes the idea in words which, as Tyndall has said, 'have in them the forecast of prophecy.' The idea received more definite formulation in consequence of the researches into the nature of fermentation just referred to. In 1848 Fuchs stated that he had discovered bacteria in animals which had died of septiermia. In 1850 it was announced (Davaine, Branell, Pollender) that bacilli had been detected in the earcasses of animals affected with anthrax. The discovery was corroborated by various observers. But it was not till the disease had been induced by the inoculation of healthy animals with a minimal quantity of the organism (Davaine) that the Bucillus anthracis was recognised as the cause of the disease. Thus was afforded the first substantial proof of the germ theory. This success inspired further research on kindred lines. In eomparatively quick succession other discoveries were announced, till, in 1882, Koch described the Bacillus tuberculosis as the organism responsible for the scourge of consumption, and in 1883 the baeillus of eliolera.

Emphasis must be laid on the statement that the discovery of an organism in the circulation or tissnes of a diseased animal cannot be accepted as proving the causal efficacy of the former. Apart from further experiment, it were perfectly fair to argue that such organism was a mere accompaniment of the morbid state, flourishing on the dying factors are recognised. It has, moreover, frequently happened that competing claims have been advanced in explanation of the same disease. It was necessary, therefore, that there should be formulated (Klebs, Koch) certain conditions, since known as Koch's postnlates, which must be fulfilled by an organism whose causal relationship with a given disease is maintained. These are as with a given disease is maintained. These are as follows: (1) The organism must be demonstrated in the circulation or tissues of the discascil animal; (2) the organism, so demonstrated, must be capable of artificial cultivation in suitable media outside the body, and successive generations of pure cultivation obtained; (3) such pure cultivation must, when introduced into a healthy and susceptible animal, produce the given disease; (4) the organism puret again he found in the chambet in the ism must again be found in the circulation or tissues of the inoculated animal. The claims of organisms which fail to meet these demands must

be set aside to await further proof.

The number of diseases whose specific origin is now generally admitted is comparatively large, but of few of these can we speak with the same tuberculosis) and splenic fever (anthrax). In other words, the fulfilment of all four postulates by many of them has not been demonstrated or has been disputed. Besides anthrax and tuberenlosis, the list includes leprosy, cholera (Asiatic), relapsing fever, typhoid fever, yellow fever, malaria, diphtheria, dysentery, syphilis, acute pneumonia,

gonorrhea, septicamia, erysipelas, actinomycosis &c. With considerable probability we may add whooping-cough, measles, scarlatina, typhus, smallpox, hydrophobia, tetanus, British cholera, &c.; but the evidence regarding these and others is defective, and, in some cases, less substantive than analogicál.

The specific organisms associated more or less exactly with those diseases are members of the groups (a) Coccacen and (b) Bacteriacen (see

Bacteria).

The admission that certain diseases are due to the presence and action of specific living organisms

raises the further questions: (1) How do they enter the body? (2) How do they act?

(1) How do they enter the body? It has been conclusively shown that the Bacillus tuberculosis may obtain access by the inhalation of germ-laden may obtain access by the inhalation of germ-laden air, by the ingestion of affected milk and possibly of tubercular meat, perhaps, too, through a cut or sore. It seems also likely that the bacilli may be transmitted from mother to feetns by way of the circulation. Similar lines of attack may be predicated of all the pathogenic organisms. Notably, in connection with wounds, it is important to bear in unid the possibility of infection with the germs which induce septicamia—a fact on which was based the great advance in surgery associated with the name of Lister. See ANTI-SEPTIC SURGERY.

The possibility of infection varies much according to the conditions of growth of the particular organism and the receptivity of the host. This explains, on the one hand, the popularly accepted view that certain diseases are much more infective than others. Thus, typhoid fever differs widely from scarlatina in respect of degree of contagious-ness. On the other hand, some persons undoubtedly are more susceptible to the attacks of certain organisms. Thus, among the subjects of tuberculosis, it is probable that preparedness of soil plays an important part in the production of the disease. And so with other pathogenic organisms. These processes have their analogy in the more common phenomena of vegetable life. Sow some seeds and they will germine and group are accepted. they will germinate and grow on any soil, however unlikely. Other seeds may be scattored profusely, but will not develop, unless the soil has been carefully prepared and the other conditions of growth be fulfilled. It is impossible to enter here on the discussion of those conditions. Necessarily they vary much with different organisms. But it is important to realise the extreme value, from the therapeutic point of view, of their careful study. The first step to a rational treatment of such diseases is to know the responsible organism. This knowledge must include not only its shape and other physical characters, but the life history of the microbe, and the conditions which assist or retard its development and reproduction. Such knowledge affords the only sound basis for a system of preventive medicine, which constitutes one of the most important departments of practical hygiene. Although still in its infancy, the preventive treatment of endemic, epidemic, and other contagious diseases has now become

2) How do the organisms act? This is a muchdebated question. It has been the subject of some of the most valuable of recent researches in this department. Do they act mechanically as irritants? Or is their action privative, by stealing from the tissues elements which are necessary to their development? Or have they a power of elaborating or continuous and the properties of the continuous continuous and the continuous continuous and the continuous continu (or secreting) new products, which exert a toxic influence on the affected body? This last view is supported by weighty evidence and by the analogy of the fermentation processes already referred to.
It would therefore seem that the microbe has the is the name given to a body in Germany that

power of disturbing-or rather that, in order to the preservation of its own life, the microbe is compelled to disturb—the molecular arrangement of the elements in the medium in which it is developing. The products thus elaborated have been termed Ptomaines ($Pt\bar{o}ma$). They were so named The products thus elaborated have been by Selmi, who discovered their presence in the dead body during various stages of putrefaction. The ptomaine doctrine has been accepted in explanation of the process of septicamia, and there is good reason for extending its application to the other infective processes. It is essential, however, to remember that, after the microbe has succeeded in invading the tissues, its further progress is not unopposed. There is a constant warfare between the living cells of the host and the living and multiplying cells of the invader, the contest being decided in favour of the stronger. The researches of Metschi nikoff and others seem to show that the bacilli can be destroyed by the white corpuscles of the blood.

Granted that the organisms have entered the tissues or circulation, there still remain for the physician two modes of attack: (a) by attempting to exterminate the microbe itself through such agents as may be discovered to be possessed of germicidal properties; (b) by endeavouring to antagonise the poison which the microbe is distributing through the system. Many difficulties attend both methods, inasmuch as agents sufficiently potent to effect either object are themselves likely to prove injurious to the infected tissues. The aim of curative medicine is the discovery of remedies capable of preventing the growth of the microbe, yet

innocuous to the host.

Reference must be made, in conclusion, to the question of immunity. It is well ascertained that certain animals are not susceptible to the attacks of certain pathogenic organisms, and that others suffer comparatively slightly. In man there may be traced the occurrence of individual immunity. Such facts have not yet received a satisfactory explanation. The almost universal immunity after a first attack of certain fevers and the comparative immunity from smallpox conferred by Vaccination (q.v.) are of interest in this connection. The experiments of Pastenr and others on Bacillus anthracis indicate that by repeated cultivation under special conditions it is possible to lessen the virulence of the most virulent of organisms and that inocula-tion with this altered bacillus confers immunity against further attack. More striking still are the experiments of Pasteur in connection with rabics (Hydrophobia, q.v.). By a special method that observer has accomplished an attenuation of the virus —the microbe not having been determined—where-by the worst features of the disease are disturbed. By this means it has been found possible in cases of infection to anticipate a serious attack by the introduction of this modified virus. In explanation of this it has been supposed that a poisonous ptomaine is germinated during the process, which, when inis germinated utiling the process, which when in-jected in quantity during the stage of incubation of the disease, prevents the development of the supposititious germ. Those and other kindred observations disclose a most hopeful development of the germ theory in the direction of preventive inoculation.

The literature is a very large one. For general purposes the following may be consulted: Tyndall, Essays on the Floating Matter of the Air; Watson Cheyne, Antiseptic Surgery; Pasteur, Studies on Fermentation; Duolaux, Ferments et Maladies; Flüge, Fermente und Mikroparasiten; Schützenberger, Les Fermentations; Gussenbauer, Pyo-hamie und Pyo-Sephthämie; and the works of Lister, Klein, &c.

German Barm. See YEAST.

separated from the Roman Catholic Church in 1844. Whatever might be the deeper causes of the schism, the immediate occasion of it was the exhibition of the Holy Coat at Treves (q.v.). In 1844 Bishop Arnoldi appointed a special pilgrimage to this relic. This proceeding called forth a protest from Johannes Ronge (1813–87), a priest in Silesia, who, having quanelled with the authorities of his church, had been suspended. Ronge addressed a public letter to Bishop Arnoldi in which he characterised the exhibition of the coat as idolatry. A short time previously, Czerski, a priest at Schneidemühl, in Posen, had seeded from the Roman Catholic Church, and had formed a congregation of 'Christian Apostolic Catholics.' Czerski and Ronge were naturally drawn into confederacy. Ronge addressed an appeal to the lower orders of the priesthood, calling upon them to use their influence in the pulpit and everywhere to break the power of the papal curia, and of priesteraft in general, thronghout German; to set up a national German Church independent of Rome, and governed by councils and synods; to abolish auricular confession, the Latin mass, and the celibacy of the priests; and to aim at liberty of conscience for all Christians.

conscience for all Christians.

The first congregation of the new church was formed at Schneidemühl, and took the name of 'Christian Catholic.' The confession of faith, which was drawn up by Czerski, differed little in point of doctrine from that of the Catholic Church. The confession drawn up by Ronge for the congregation at Breslau, on the other hand, completely departed from the doctrine and ritual of the Roman Catholic Church. The Scripture was laid down to be the sole rule of Christian faith, and no external authority was to be allowed to interfere with the free interpretation of it. The essentials of belief were restricted to a few doctrines: belief in God as the Creator and Governor of the world, and the Father of all men; in Christ as the Saviour, in the Holy Spirit, the holy Christian church, the forgiveness of sins, and the life everlasting. Baptism and the Lord's Supper were held to be the only sacraments, though confirmation was retained. At the first council of German Catholics, held at Leipzig in 1845, the principles of the Breslau Confession were substantially adopted; and by the end of the year there were some 300 congregations.

But German Catholicism was destined soon to find enemies both within and without. To say nothing of ortholox Catholics, eonservative Protestantism began to suspect it as undermining religion. And, as the movement fell in with the liberal tendencies of the times, the governments took the alarm, and set themselves to cheek its spread. Saxony took the lead, and Prussia soon followed, in imposing vexations restrictions upon the 'Dissidents;' in Baden they were denied the rights of citizens, while Austria expelled them from her territories. It was more, however, internal disagreements than state persecutions that cheeked the prosperity of German Catholicism. Czerski and his adherents held closely by the doctrines and ritual of Rome; while Ronge's party approached nearer and nearer to the extreme Rationalists, and, leaving the province of religion altogether, occupied themselves with freethinking theories and democratic politics. When the great storm of 1848 burst, Ronge was active in travelling and preaching, and, although his freethinking and political tendencies were repudiated by numbers of the body, they predominated in many places. After the political reaction set in, strong measures were taken against the German Catholics. The early enthusiasm of the movement apparently died out, and after the dissolution of the Frankfort parliament Ronge retired to London (in 1861 he returned to Germany, and lived successively at

Breslan, Frankfort, Darmstadt, and Vienna). In 1850 a conference was held between the German Catholies and the 'Free Congregations' (Freie Gemeinden), an association of freethinking congregations which had been gradually forming since 1844 by secession from the Protestant Church, and with which an incorporate union was effected in 1859. Six years later the council refused to commit itself to belief in a personal God. From a membership of 13,000 in 1867 in Prussia and Saxony, the body has gradually dwindled to almost total extinction. The Old Catholies (q.v.) may be regarded as having superseded the German Catholie movement. See Kampe's Geschichte des Deutschkatholicismus (1860).

German, Cousin. See Cousin.

Germander (Teuerium), a large and widely distributed genus of labiate herbs, of which all the European species are of old medicinal repute on account of their aromatic, bitter, and stomachic properties. The species are numerous. The Wall Germander or True Germander (T. chamadrys), often found on ruined walls, has probably been introduced from the south of Europe. With the German T. Botrys, it enjoyed a high reputation in the treatment of gout. Wood Germander or Wood Sage (T. Scorodonia) is a very common British plant, in dry bushy or rocky places. It is very bitter and slightly aromatic. It is used in Jersey as a substitute for hops. Water Germander (T. Scordium), in wet meadows, has a smell like garlic. Cat or Sea Thyme (T. Marum), of southern Europe, like catmint and valerian rock, has great attractiveness for eats. It is still sometimes used in the preparation of sneezing powders.

Germanicus Cæsar, a distinguished Roman general, was the son of Nero Claudius Drusus, and of Autonia, daughter of Mark Antony and nice of Augustus. He was born 15 B.C., and by desire of Augustus was adopted in the year 4 A.D. by Tiberius, whom he accompanied in the war against the Panarical Antonia and Augustus Ward Antonia and Antonia nonians, Dalmatians, and Germans. In the year 12 he was consul, and next year was appointed to the command of the eight legions on the Illine. In 14 he was at Lugdunum Batavorum when news came of the death of the Emperor Augustus and of the or the death of the Employor Augustus and of the mutiny for more pay and shorter service among the soldiers in Germany and Illyrioum. Gormanicus hastened to the camp and quelled the tumult by his personal popularity; and at once led his soldiers against the enemy. Crossing the Rhine below Wesel, he attacked and routed the Marsi, and next year marched to meet the redoubtable Arminins (q.v.), the conqueror of Varus and his legionaries, whose bones had lain whitening for six years in the Teutoburg Forest. With solemn rites his soldiers buried these sad relies of disaster, then edited as with the formula of the control of the c then advanced against the foe, who, retiring into a difficult country, managed to save himself, and was not subdued until the year after, when Germanicus again carried a part of his army up the Ems in ships, crossed to the Weser, and completely overthrew Arminius in two desperate battles. The victories thus achieved were to have been followed up in the succeeding years, but Tiberius, jealous of the glory and popularity of Germanicus, recalled him from Germany in the year 17, and sent him to settle affairs in the East, at the same time appointing as viceroy of Syria, in order secretly to counteract him, the haughty and envious Cn. Calpurnius Piso. Germanicus died at Epidaphnæ, near Antioch, 9th October 19, probably of poison, to the profound sorrow of provincials and Romans alike. His wife, Agrippina, and two of her sons were put to death by order of Tiberins; the third son, Calignia, was spared. Of the three daughters who survived their father, Agrippina became as remarkable for her

vices as her mother had been for her virtnes. Ger-Roman history. The courage and success of the soldiership that had blotted out a great national disgrace, the noble magnanimity of his private character, the simplicity and purity of his life, and the shadow of impending death that touched him with romantie interest, combined to make him the darling of his contemporaries, and has left him, as portrayed in the pages of Tacitus (Annals, i. and ii.), still a figure of unique interest to us.

Germanium, a metallic element discovered in 1885 by Dr Winkler in a silver ore (argyrodite); symbol, Ge; atomic weight, 72.3. It has a melting-point about 1650° F. (900° C.); is oxidised when heated in air; crystallises in octahedra; has a perfectly metallic lustre, and is of a grayish-white colour. As gallium had been named from France, the new metal was named after Germany. Fifteen years before its discovery its existence was prophesied by Mendeleëff as required to fill the gap in the periodic table between silicon and tin. See ATOMIC THEORY.

German Ocean. See North Sea.

German Silver. This is a triple alloy of copper, nickel, and zinc, and is sometimes called nickel silver. The best quality of it consists of four parts copper, two parts nickel, and two parts zine, but this quality is the most difficult to work. For some purposes the proportion of copper is slightly increased, and for articles which are to be singled increased, and for intrices which are to be cast instead of stamped or hammered about 2 per cent. of lead is added. To make a good malleable alloy, the three metals of which it is composed should all be of the best quality. German silver has a tendency to crack in Annealing (q.v.), and is all the more liable to do this if its component metals are impure. Its crystalline structure is got rid of by hammering rolling, and appending. It is rid of by hammering, rolling, and annealing. It is harder and tougher than brass, and takes a fine polish. In colour it is sufficiently near silver to make it valuable for plating with that metal. This, togother with its hardness in resisting wear, has caused a great demand for German silver for certain wares made in Birmingham and Sheffield. Spoons and forks of this alloy are made in im-

menso numbers. Such articles as salvers, dishments infinites. Shell articles as savers, districtively made of it, but these objects, or at least some of them, are still more largely made of Britannia Metal (q.v.), a greatly inferior alloy, because much softer. German silver has a coppery odonr, and is readily attacked by acid liquids, such as vinegar, which coat it with verdigris. Spoons and forks was deaft this alloy down, either the wholes. made of this alloy should therefore either be plated

with silver or carefully kept clean.

Of late years, through care in preparing a suitable alloy, large objects, such as the bodies of jugs and coffee pots, can be formed of sheet German silver by 'spinning' it on the lathe, instead of by stamping or by the slow process of hammering. Formerly it was only a soft alloy like Britannia metal that could be so treated. For some time past there has been a tendency to substitute for electroplate—i.e. German silver plated with real silver—white alloys having nickel for their basis. These, however, are but varieties of German silver known under different names, such as silveroid, argentoid, navoline, and niekeline. Some of them contain small quantities of tin, cadmium, and other metals. Mountings for ship cabins, har-fittings, and also forks and spoons have been manufactured on a considerable scale from these new alloys.

British eamp, in the early morning of 4th October 1777, was repulsed, the Americans losing 1000 men, the British 600.

Germanns, St, was Bishop of Auxerre, and is said to have been invited over to Britain to combat Pelagianism in 429. Acting under his directions the Christian Britons won the bloodless 'Allelnia Victory' over the Piets and Saxons. In 1736 a column was erected on the supposed site, Maes Garmon (Germanus' field), in Flintshire. There are several churches in Wales and Cornwall dedicated to St Germanns.

Germany (from Lat. Germania) is the English name of the country which the natives call Deutschland, and the French L'Allemagne (see ALE-MANNI). The word is sometimes used to denote the whole area of the European continent within which the Germanic race and language are dominant. In this broad sense it includes, besides Germany proper, parts of Austria, Switzerland, and perhaps even of the Netherlands; but in the present article the name is to be understood as denoting the existing Germanic empire, of which Prussia is the head. ing Germanic empire, of which Prussia is the head. Germany occupies the central portions of Europe, and extends from 5° 52′ to 22° 53′ E. long., and from 47° 16′ to 55° 54′ N. lat. It is bounded on the N. by the German Ocean, the Danish peninsula, and the Baltie; on the E. by Russia and Austria; on the S. by Austria and Switzerland; and on the W. by France, Belgium, and the Netherlands. The population in 1871 was 41,058,792; in 1880, 45,234,061; in 1885, 46,855,704. Its area is 211,168 sq. m., or about \$\frac{1}{10}\$th of that of all Europe—slightly larger than France, but not twice as large as Great Britain and Ireland. The coast-line measures about 950 miles. measures about 950 miles.

Germany is composed of a federation of twentyfive states, with one common imperial province, the names of which, with their areas and popula-tions in 1885, are given in the following list. They are elsewhere treated of in special articles, under

their respective names.

States	Area in sq. m.	Pop in 1885.
KINGDOM8		
1. Prussia	186.078	28,918,476
2. Bavaria	20,632	5,420,199
3. Saxony	5,856	3,182,663
4. Wurtemberg	7,619	1,995,185
GRAND-DUCHIES-	1,020	×,5500,120
5. Baden	5,861	1,001,255
6. Hesse	8,006	950,011
7. Mecklenburg-Schwerin,	5,197	575,152
8. Saxe Weimar	1,404	813,946
9. Mecklenburg-Strelitz	1,144	98,871
10. Oldenburg	2,503	341,525
Ducines-	2,000	041,010
11. Brunswick	1,441	372,452
12. Baxe-Meiningen	ี้ วิธีวิ	214,884
13. Saxe-Altenburg	517	161,460
11. Saxe-Coburg-Gotha	765	198,829
15. Anhalt	917	248,166
Principalitins-	0.,	**20,200
16. Schwarzburg-Sondershausen.	337	78,666
17. Schwarzburg-Rudolstadt	367	83,886
18. Waldeck	438	50,575
10. Renss-Greiz.	123	55,904
20. Renss-Schleiz	328	110,508
21. Schampburg-Lippe	133	87,204
22. Lippe-Detmold	475	128,212
Free-Towns-	310	120,212
23. Lübeck	116	67,658
24. Bremen	100	165,628
25. Hamburg	160	518,026
Reicesland-	1 .00	020,020
20. Alsace-Lorraine	5,668	1,564,855
		
	211,165	46,855,764

German Tinder. See Amadou.

Germantown, a former borough of Pennsylvania, included since 1854 in the limits of Philadelphia. Here an attack by Washington on the

than Wales, and Baden and Saxony are neither of them equal to Yorkshire. Waldeck is about equal to Bedford, and Reuss-Greiz is smaller than Rutland, the smallest English county. The Duke of Sutherland's estates (1838 sq. m.) are larger in area than all Mecklenburg-Strelitz, or than all Brunswick, respectively tenth and ninth in size of the German states. The Duke of Buccleuch's Saottish estates along (672 grant in the control of Scottish estates alone (676 sq. m.) exceed in arca Saxe-Altenburg or any of the eleven smaller states.

In 1885 Berlin, the capital of the empire, had 1,315,287 inhabitants; Hamburg, 305,690; Breslau, 299,640; Munich, 261,981; Dresden, 246,086; Leipzig, 170,340. There were in all 21 towns with a population of above 100,000; 116 between 20,000 and 100,000; 683 between 5000 and 20,000; and 1951 between 2000 and 5000.

Benilse the religion of this issue above restricted

Besides the political divisions above mentioned, there are certain distinctive appellations applied to different parts of Germany, which have been derived either from the names and settlements of the ancient Germanic tribes, or from the circles and other great subdivisions of the old empire. Thus, the name of 'Swabia' is still applied in common parlance to the 'Swabia' is still applied in common parlance to the districts embracing the greater part of Würtemberg, southern Baden, south-western Bavaria, and Hohenzollern; 'Franconia,' to the Main districts of Bamberg, Schweinfurt, and Würzburg; 'the Palatinate,' to Rhenish Bavaria and the north of Baden; 'the Rhineland,' to portions of Baden, Rhenish Prussia, Bavaria, Hesse-Darmstadt, and Nassan; 'Voigtland,' to the high ground between Hof and Plauen; 'Thuringia,' to the districts lying between the Upper Saale and the Werra, as Saxe-Weiniar, &e.; 'Lusatia,' to the eountry between the Lower Weser and Ems; and 'Westphalia,' to the district extending between Lower Saxony, the Netherlands, Thuringia, and Hesse, to the Gennan Ocean. The four Saxon duchies and the four Schwarzburg and Reuss principalities are frequently

Schwarzburg and Reuss principalities are frequently grouped together as the 'Thuringian States.'

Physical Character.—Germany presents two very distinct physical formations. (1) A range of high tableland, occupying the centre and southern parts of the country, interspersed with numerous ranges and groups of mountains, the most important of which are the Harz and Tentoburgerwald, in the north; the Tannus, Thüringerwald, Erzgebirge, and Riesengebirge, in the middle; and the Black Forest (Schwarzwald), Rauhe Alb, and Bavarian Alps in the south; and containing an area, including Alsace and Loraine, of 110,000 sq. m. The Brocken is 3740 feet, high: the Vogres week! 4700. Ing Alsace and Lorrane, of 10,000 sq. m. The Brocken is 3740 fect high; the Vosges reach 4700; the Foldberg in the Black Forest is 4903; and the Zugspitz in the Noric Alps of Bavaria, the highest peak in Germany, is 9665 fect in height. (2) A vast sandy plain, which extends from the centre of the empire north to the German Occan, and including Sleswick-Holstein, contains an area of about 98,000 sq. m. This great plain, stretching from the Russian frontier on the cast to the Netherlands on the west, is varied by two terrace-like elevations. The one stretches from the Vistula into Mecklenburg, at no great distance from the coast of the Baltic, and has a mean elevation of 500 to 600 feet, rising in one point near Danzig to 1020 feet; the other line of elevations begins in Silesia and terminates in the moorlands of Lineburg in Hanover, its course being marked by several summits from 500 to 800 feet in height. feet in height. A large portion of the plain is occupied by sandy tracts interspersed with deposits of peat; but other parts are moderately fertile, and admit of successful cultivation.

The surface of Germany may be regarded as belonging to three drainage basins. The Danube (q.v.) from its source in the Black Forest to the borders of Austria belongs to Germany; and

through its channel the waters of the greater part of Bavaria are poured into the Black Sea. Its chief tributaries are the Iller, Lech, Isar, and Inn on the right; and the Altmilhl, Nab, and Regen on the left. By far the greater part of the surface (about 185,000 sq. m.) has a northern slope, and belongs partly to the basin of the North Sea, partly to that of the Baltic. The chief German streams of Bavaria are poured into the Black Sea. flowing into the North Sea arc the Rhine (q.v.), with its tributaries the Neckar, Main, Lahn, with its tributaries the Neckar, Main, Lahn, Sieg, Wupper, Ruhr, and Lippe on the right, and the ill and Moselle on the left; the Weser (q.v.), with its tributaries the Aller; and the Elbc (q.v.), with its tributaries the Havel, Mulde, and Saale. Into the Baltic flow the Oder (q.v.), with its tributaries the Warthe, Neisse, and Bober; the Vistula (q.v.), or in German Weichsel, with its tributaries the Narew, Drewenz, and Brahe; the Memel; and the Pregel.

The natural and artificial waterways of Germany are extensive, especially in the northern plain. The most important of the numerous canals which connect the great river-systems of Germany are Ludwig's Canal (110 miles long) in Bavana, which, by uniting the Dannbe and Main, opens a com-munication between the Black Sea and the German Ocean; the Finow (40 miles) and Friedrich-Wilhelm's (20 miles) canals in Brandenburg; the Plaue Canal (20 miles), between the Elbe and the Havel; the Kiel and Eider Canal (21 miles), uniting the Baltie and German Ocean; and the canals between the Oder and Vistula, Rhine and Rhone (225 miles), and Rhine, Marne, and Seine (165 miles). The North Sea and Baltic Canal, from Brunsbüttel at the mouth of the Elbe to Kiel, begun in 1887 and to be finished in 1895, is intended chiefly for warships. Numerous lakes occur both in the table-land of southern Germany (Bavaria) and in the low lands of the northern districts, but few of them are of any great size. The so-called 'Halls' of the north coasts are extensive bays of the sea, but so curiously landlocked as to practically form large salt-water lagoons or coast-lakes. The chief are the Stettiner Haff, the Frische Haff at Königs-berg, and the Kurische Haff at Memel. Ger-many abounds in swamps and marsh-lands, which arc especially numerous in the low northern districts. Its mineral springs occur principally in Nassau, Würtemberg, Baden, Bavaria, and Rhenish Prussia. Many of these springs have retained their

high reputation from the earliest ages.

Geology.—The great plain of North Germany consists of strata of the same age as the Tertiary strata of the Paris basin, covered with very recent sand and mud. Newer Tertiary beds occupy the river basin of the Rhine north from Mainz; they consist of fine light-coloned loam, and contain the lones of the mammoth, rhinoceros, and other contemporaneous mammals. Erratics are scattered the bones of the mammoth, rhinoceros, and other contemporaneous mammals. Erratics are scattered over the north of Germany. The whole district in the centre of Germany, from the Danube northwards to Hanover, consists of Secondary strata. The rocks of the Trias period are best known in Germany, the typical rocks of Bunter Sandstein, Muschelkalk, and Kenper being developed here so as to justify the name Trias. The Trias is highly fossiliferous, abounding especially in marine shells. and containing several genera of remarkshells, and containing several genera of remarkable labyrinthodont saurious. Jurassic rocks able labyrinthodont saurians. Jurassic rocks occur in central Germany; at Hanover they consist of clays and marl, with heds of saudstone and limestone, containing coal and ironstone of such value that they have been extensively wrought. Intruded igneous rocks have tilted the beds of the Cretaceous strata in some districts to a nearly vertical position, and have metamorphosed them into crystalline marbles and siliceous sandstones.

Of the Palaozoie rocks, the Carboniferous strata are almost entirely absent from Germany.

coal obtained in the country is from rocks of a later age. True coal-beds are found in Rhenish Prussia. The scdimentary rocks of the Harz Mountains are chiefly Devonian; to the south-east, near Harzgerode, they are Upper Silurian. They are all greatly dislocated by granite and other intrusive rocks. The Harz Mountains are surrounded by a zone of Permian rocks. The stratified rocks of the Thüringerwald are also Devoniau, resting on Lower Silurian strata, the lower portion of which is highly metamorphosed into quartzose schists; the remainder consists of graywacke, slate, and sandstone, with limestone and alum slates. There are numerous facoid and annelid impressions in the older heds, and graptolites, orthoceratites, and trilobites in the newer. The basaltic rocks, trachytes, and other volcanic products are largely developed in the Eifel, Siebengebirge, Westerwald, Vogels, Rhöngebirge, and other mountain-systems of central Germany.

Climate.—The climate of Germany presents less diversity than a first glance at the map might lead one to infer, for the greater heats of the more southern latitudes are considerably modified by the hilly character of the country in those parallels, while the cold of the northern plains is mitigated by their vicinity to the ocean. The average decrease in the mean temperature is, in going from south to north, about 1° F. for every 52 miles; and in going from west to east, about 1° F. for every 72 miles. The line of perpetnal snow varies from 7200 to 8000 feet above the level of the sea. The mean annual rainfall is 20 inches. The rainfall is heaviest on the coast and in the mountains; least in Silesia, on the Danube at Sigmaringen, in Rhenish Bavaria, and at Wustrow in Mecklenburg. The rainfall in the Upper Harz reaches 66 inches. The difference between the greatest heat and the greatest cold in Germany is about 130° F. January is the coldest and July the warmest month. The following table shows the mean annual records of the temperature at different points of the continent:

	Annual mean,	Summer.	Winter.
Hamburg	47° F.	64° F.	30° F.
Dresden	48	67	29
Frankfort-on-the-Main	48.5	66	31
Berlin	,.,46'5	Œ	27
Hanover	48	63	33
Konigsberg	43	62	24

Products.—The unineral products of Germany are very rich and varied, and their exploitation forms a most important industry. The chief mining and smelting districts are in Silesia, on the Lower Rhine, in the Upper Harz, and in Saxony. Silver is found in the Upper Harz and Saxony. Iron occurs in numerous mountain-ranges, especially in Upper Silesia and in Rhenish Westphalia. Alsace and Lorraine contain a great part of perhaps the largest iron-deposit in Enrope, which stretches into France and Luxemburg. The iron of the Thüringerwald is fine, though not abundant. The chief coalfields are in Silesia, Westphalia (on the Ruhr), and Saxony—the first containing the largest coalfield in Europe. Prussia yields nearly one-half of the zine annually produced in the world. Lead is found in the Harz, in other parts of Prussia, and in Saxony. A little copper is mined at Mansfeld. Tin and tungsten are yielded by the Erzgebirge; manganese at Wiesbaden; quicksilver in Westphalia; antimony in Thuringia. Salt is produced at Halle, Stassfürt, and other parts of Prussia. Germany is rich in clays of all kinds, from the finest to the coarsest: the porcelain of Meissen, the pottery of Thuringia, and the glass of Silesia and Bavaria are celebrated. Building stone is well distributed; marble, alabaster, slates, and lithographic stones also occur; and cobalt,

arsenic, sulphur, saltpetre, alum, gypsum, bismuth, pumice-stone, Tripoli slate, kaolin, emery, ochre, and vitriol are all among the exports of Germany. The following table shows the production of the five years 1882-86, with the yearly average, and the produce and value for 1887, of the chief minerals of Germany (including the duchy of Luxemburg):

0,				
	1882-1886. tons	Yearly Average. tons.	Produce in 1887. tons.	Value in 1887.
Anthracite	.281,672,500	56,334,500	60,334,000	115,553,850
Lignite	73,620,300	14,724,060	15,898,000	2,010,050
Salt	. 7,051,700	1,410,340	1,455,500	735,400
Iron ore	43,669,300	8,733,860	9,351,100	1,700,250
Zinc ore	3,390,300	678,060	900,700	501,100
Lead ore	826,700	165,340	157,600	796,150
Copper ore		578,020	507,000	727,600
Gold and silver or		23,860	25,700	208,900
Vitriol, &e,		140,650	101,700	38,800
Other minerals.	. 369,000	73,800	110,500	168,200

Total.....414,357,600 82,871,520 83,873,000£122,440,800

The vegetable products comprise a very large proportion of the European flora. All the ordinary cereals are extensively cultivated in the north, but in 1888 the value of the wheat, barley, oats, and rye imported exceeded the value of that exported by £2,261,700. The export of potatoes exceeded the import by £423,400. Hemp and flax, madder, woad, and saffron grow well in the central districts, where the vine, the cultivation of which extends in suitable localities as far north as 51°, is brought to great perfection. The best wine-producing districts are the valleys of the Danube, Rhine, Main, Neckar, and Moselle, which are, moreover, generally needs, and Mosene, which are, horeover, generary noted for the excellence of their fruits and vegetables. The best tobacco is grown on the Upper Rhine, on the Neckar, and in Alsace, but inferior qualities are largely produced elsewhere. The hops of Bavaria have a high reputation, and the chicory grown in that country, and in the district between the Elbe and Weser, is used all over Europe as a cultimate for cottes. as a substitute for collec. Magdeburg is the centre of a large beetroot-growing industry. According to the survey of 1883, corrected for 1887, 48 7 per cent. (65,779,920 acres) of the entire area of the empire was given up to arable land, garden land, and vineyards. Anhalt had the highest proportion of such land; and, excluding the domains of the free towns, Oldenburg had the lowest. About 20:3 per cent. (27,361,428 acres) was occupied by heath, per cent. (27,001,428 acres) was occupied by heath, meadow, and pasture, Oldenburg containing the greatest proportion, and Saxe-Coburg-Gotha the lowest. The chief crops in 1887 were meadow-hay, 14,778,650 acres; rye, 14,605,700 acres; oats, 9,525,610 acres; potatoes, 7,295,368 acres; wheat, 4,799,200 acres; barley, 4,327,800 acres; and spelt, 926,790 acres. In 1887-88 tobacco occupied 53,605 acres; in 1881-82, 68,120 acres. Vines covered 300,525 acres in 1887-88, and yielded 52,624,924 gallons of wine. The most extensive forests are found in central Germany, while the deficiency of wood in the north west parts of the great plain is in some degree met by the abundance of turf. Germany in 1883 had 34,770,995 acres (25.7 per cent. of its area) in woods and forest. Schwarzburg-Rudolstadt had the highest proportion of area devoted to forest; and, excluding the free-towns, Oldenburg had the lowest. largest forests are of firs and red pines (as in the Black Forest, Upper Harz, Thüringerwald, and Riesengebirge), beech (Lower Harz and Baltic

coast), pines (east of Elbe, Bavaria, Franconia, and on the Rhine), and oaks (Lower Rhine, Westphalia, Odenwald, and Upper Silesia).

Germany has long been noted for the good breed of horses raised in the north; Saxony, Silesia, and Brandenburg have an equal reputation for their sheep and the fine quality of the wool which thoy yield; and the rich alluvial flats of Mecklenburg

GERMANY

and Hanover are celebrated for their cattle. The forests of northern and ccutral Germany abound in small game of various kinds; and a few still shelter wild boars. The Bayarian Alps afford shelter to the larger animals, as the ebamois, the red deer and wild goat, the fox and marten. Wolves are still found in Bavaria, the eastern provinces of Prussia, and in Lorraine. The bear is now extinct, and the beaver nearly so. In all the plains in the north storks, wild geese, and ducks are abundant. Among the fishes of Germany the most generally distributed are carp, salmon, trout, bearing mussels, and leeches. The oyster, herring, bearing mussels, and leeches. The oyster, herring, and cod fisheries constitute important branches of industry on the German shores of the Baltic and North Sca. Germany stands next to Great Britain in regard to the care and success with which its agricultural, mining, and other natural capabilities agricultura, mining, and other hatting capacitates have been cultivated. All the German states, and especially Prussia, Saxony, and Bararia, encourage agriculture, and have endeavoured, by the establishment of agricultural colleges and exhibitions, to diffuse among the people a know-Forestry ledge of recent scientific appliances. Forestry receives almost as much attention in Germany as agriculture; and, like the latter, is elevated to the rank of a science. The larger woods and forests in most of the states belong to the government, and are under the care of special boards of management, which exercise the right of supervision and con-

trol over all forest lands, whether public or private.

Manufactures.—The oldest and most important of the German industrial arts are the manufactures of linen and woollen goods. The chief localities for of the first and preparation of flax, and the weaving of linen fabrics, are the mountain-valleys of Silesia, Lusatia, Westphalia, and Saxony (for thread-laces); while cotton fabrics are principally made in Ithenish Prussia and Saxony. The same districts, together with Pomerania, Bavaria, Alsaee, Witrtenberg, and Baden, manufacture the choicest woollen fabrics, including damasks and carpets. The silk industry has its central point in Rhenish Prussia, with a special development in the district of Düsseldorf. Germany rivals France more keenly in the production of satins than in that of heavier all-silk goods. Jute-spinning is carried on in Brunswick, at Meissen, and at Bonn; thread is manufactured in Saxony, Silesia, and the Rhine provinces; and hosiery is most largely produced in Saxony and Thuringia. The making of toys and wooden clocks, and wood-carving, which may be regarded as almost a speciality of German industry, flourish in the hilly districts of Saxony, Bavaria, and the Black Forest. Paper is made chielly in the districts of Aix-la-Chapelle, Arnsberg, and Liegnitz, and in Saxony. Tanning, especially all silk goods. Jute spinning is carried on in Brunsand Liegnitz, and in Saxony. Tanning, especially in the south-west, is an ancient German industry. The best iron and steel manufactures belong to Silcsia, Hanover, and Saxony; in 1887, 4,024,000 tons of iron, representing a value of £8,322,150, were handled in the foundries of Germany. Silesia probably possesses the finest glass-manufactories, but those of Bavaria are also important; while Saxony and Prussia stand pre-eminent for the excellence of their china and eartheuware. Augsburg and Nuremberg dispute with Munich and Profits title title to the control of the control Berlin the title to pre-eminence in silver, gold, and jewelry work, and in the manufacture of philosophical and musical instruments; while Leipzig and Munich claim the first rank for typefounding, printing, and lithography. The trading cities of northern Germany nearly monopolise the entire business connected with the preparation of tolacco, snuff, &c., the distillation of spirits from the potato and other roots, and the manufacture of beet-root sugar; while vinegar and oils are pre-

pared almost exclusively in central and southern Germany. In 1885-86, 918,948,000 gallons of beer were brewed in the German empire, the chief producing states being Prussia (477,138,200 gals.) and Bavaria (278,645,400 gals.). The annual consumption per head of the population is 19.3 gallons. According to the industrial census of 1882, the number of persons in Germany engaged in mannfactures and commerce was 7,966,783. The following figures, showing the distribution of that total, afford a view of the comparative importance of the various industries: Clothing, washing, &c., 1,334,007; building and related industries, 946,583; retail trading, \$53,827; textile industries, \$50,859; metal-working, carriage and ship building, &c., \$13,906; preparation of food and food-materials, 663,226; mining (including founding and saltwinning), 552,020; workers in wood and wicker, 521,660; postal service, transport, &c., 437,040; lodging and refreshment, 279,451; industries in stone, earth, clay, 221,006; paper and leather working, 220,039; chemiculs and lighting materials, 88,307; printing, &c., 69,643; art industries, 23,893; miscellaneous, 91,226. Besides these, 8,065,350 were engaged in agriculture, 91,630 in forestry and hunting, 55,168 in horticulture, and 24,348 in fishing.

Commerce and Shipping.—The multiplicity of small states into which the German land was long broken up opposed great obstacles to the development of commerce; but the difficulty was to some extent obviated by the establishment of the Zollverein (q.v.), or Customs and Trade Confederation, and partly also by the absorption of several of the smaller states by Prussia. In 1871 a Zollund Handels-Gebiet (Customs and Trade Territory) was formed in Germany, including Luxemburg (1010 sq. m.; 213,283 inhabitants in 1885) and the Austrian district of Jungholz (212 inhabitants), but excluding Hamburg, Bremen, and parts of Oldenburg, Prussia, and Baden (together 140 sq. m.; 754,705 inhabitants). On October 15, 1888, however, all these districts entered the union, with the exception of the Baden territory (4054 inhabitants), and part of the old free-port of Hamburg (152 inhabitants). The old Zollverein parliament is represented by the Roichstag, and the Zollverein council by the Bundesrath, which appoints three permanent committees—for finance, for excise and enstoms, and for trade. The revenues of the union are derived from enstoms duties upon imports, and from excise duties on tobacco, salt, bectroot-sugar, brandy, malt, &c., and are divided among the different states according to the populations.

The following table shows the exports of home produce and the imports for home consumption in 1888, for the enstoms union as constituted before October of that year:

Official Class.	Exports.	Importe,
1. Living animals. 2. Seeds and plants. 3. Animal products. 4. Fuel. 5. Food-staffs. 6. Tallow, oils, &c 7. Chemicals and drugs. 8. Stone, elay, and glass. 9. Metals and metal goods 10. Wood and wickerwork. 11. Paper. 12. Leather and hides. 13. Texhles and felt. 14. Caoutchoue. 15. Carriages, furniture, &c. 16. Machinery and instruments. 17. Hardware, toys, &c 18. Litterature, art, &c. 19. Miscellaneous. Total.	£4,725,350 1,305,900 1,057,550 1,764,960 19,569,450 1,330,900 11,806,450 5,870,450 24,334,950 6,650,400 11,840,100 551,701,950 11,252,300 11,252,300 12,348,450 3,050,400 3,050,400 33,050	£7,783,200 2,129,800 4,061,100 3,550,000 37,561,350 10,703,960 12,112,250 2,560,060 15,857,500 8,531,800 61,271,250 61,271,250 2,570,000 1,420,100 2,472,500 1,270,000 1,270,000 1,314,550

These totals, which include the returns of gold and silver, show a considerable increase on the and silver, show a considerable increase on the annual average for the live preceding years (1883-87), which was for exports, £157,612,750; for imports, £156,904,450. Taking into account the general commerce also, the total value of imports in 1888 was £257,690,300; of exports, £247,739,400. Great Britain, Russia, Austria, Belgium, the Netherlands, and France contributed more of the German imports than any other countries; Great Britain, Austria, the Netherlands, and France took more of the exports. German foreign trade has expanded since 1871, as is shown by the fact that, whereas the exports from Germany to Great Britain had in 1871 a value of £19,263,319, in 1887 the value was £24,563,536.

The German mercantile flect is the fourth in the world, being excelled only by those of Great Britain, the United States, and France. In 1889 Britain, the United States, and France. In 1889 it consisted of 2885 sailing-ships, of 781,315 tons burden, and 750 steamers, of 502,579 tons; making a total of 3635 vessels, of 1,233,894 tons, with 36,258 sailors. In 1871 there were 4519 vessels, of 982,355 tons. The leading ports are Hamburg, Bremerhaven (for Brennen), Stettin, Danzig, Kiel, Lübeck, and Königsherg. In 1887 there entered German ports 50,124 ships (9,840,927 tons) with lading, and 9768 (892,257 tons) empty or in ballast; and in the same year there cleared 45.076 ships tanting, and 9708 (352,257 tons) enlipty of in Banas; and in the same year there cleared 45,076 ships (7,966,526 tons) with lading, and 14,769 (2,803,243 tons) empty or in ballast. Of the shipping entering 3,052,450 tons were British, and 699,000 tons Danish; 5,591,000 tons were German. Besides this maritime shipping trade, Germany earries on a very active commerce between its own internal ports, by means of 20,300 vessels (1153 steamers), plying on the numerous navigable rivers and êanals.

In hor commercial policy Germany has of late years committed herself more and more to protection; and by a law of July 1879 a protective policy was substituted for the previous free-trading principles of the empire. The chaos of coinages principles of the ompire. The chaos of comages in use before the establishment of the empire has been rectified by the substitution (1873) of a uniform imperial system, the standard being gold (see BIMETALLISM). The silver mark, superseding guldens and thalers, is almost exactly equal to a shilling in value. Since 1872 the metrical system

of weights and measures has been in use.

Railways, &c.—The first railway in Germany was the Ludwigsbalm between Nuremberg and Fürth, completed in 1835; but the first of any length was built between Leipzig and Dresden in 1837–39. In 1887–88 the railways in Germany had a total length of 24,706 English miles. Of that total 21,268 miles were state lines, 263 miles were private lines under state management, and 3175 miles were private lines under private management.

The postal and telegraphic systems of all the German states, except Bavaria and Würtemberg, are now under a central imperial administration; and since 1872, in accordance with treaties con-cluded between Austria and Prussia, a German-Austrian postal union has been established. The postal system includes the expedition of passengers and goods by the post-carriages of the several departments. In 1887 there were 19,476 post-offices in the empire, and 14,990 telegraph-offices. The total length of telegraph lines at the end of 1887 was 55,748 miles, with 198,214 miles of wire. This length of the post-office was the context of the double department employed 101,208 hands. 1887-88 its income was £10,672,322, and its expenditure £9,157,247.

Population, &c.—Four-fifths of the population of this country are of the race called in English Germans, in French Allemands, but by the people themselves Deutsehe. The term Deutsch,

Gothic thindisk, in Old High Ger. dintise (Latinised into theotiscus), is derived from the Gothic substantive thiuda, 'people,' and therefore meant originally the popular language; or, in the month of the learned, the vulgar tongue. In the 12th and 13th centuries it became the accepted designation both of this widespread tongue and of the race that

The German-speaking inhabitants of the empire number upwards of 43,000,000; but a considerable proportion of these are not of the Germanic stock. Among the peoples retaining their own language (about 31 millions) are Poles (exclusively in eastern (about 34 millions) are Poles (exclusively in eastern and north-eastern Prussia), 2,450,000; Wends (in Silesia, Brandenburg, and Saxony), 140,000; Czechs (in Silesia), 50,000; Lithmanians (in castern Prussia), 150,000; Danes (in Sleswick), 140,000; Freneh (in Rhenish Prussia, Alsace, and Lorraine) and Walloons (about Aix-la-Chapelle in Rhenish Prussia), 280,000. The Germans are divided into High and Low Germans; the language of the former is the cultivated language of all the German former is the cultivated language of all the German states; that of the latter, known as Platt-Deutsch, is spoken in the north and north-west. As to the colour of the hair, Professor Virchow caused observations to be made on the hair of 1,758,827 school children, four lifths of the total number. The result showed that 31'80 per cent. belonged to the blonde type; 14'05 to the brunette type; and 54'15 to the intermediate type. The blondes were most numerous in North Germany, the brunettes in South Germany

It is computed that there are 23,000,000 Germans beyond the boundary of the empire, of whom 91 millions are in Austria, 7 in the United States, 2 in Switzerland, 400,000 in Poland (besides 800,000 German Jews).

German Jews). There are also many in the Volga country, in middle and south Russia, Ronmania, and Turkey.

The average density of the population of Germany is about 222 per sq. m. The most densely populated country of the empire is Saxony, with populated country of the empire is Saxony, with 513 per sq. m.; the most sparsely populated is Meeklenbung-Strelitz, with 87 per sq. m. The concentration of the population in large towns is not so common in Germany as in some other countries. Although in 1885 there were 137 towns with 20,000 inhabitants and upwards, only one of these reached a million, three others 250,000 (see p. 172), and seventeen others 100,000; twenty-three had between 50,000 and 100,000.

Emigration—During the last fifty years emi-

Emigration.—During the last fifty years emigration from Germany has assumed very large proportions; but since 1881, when the highest total (220,798) was reached, the annual number of emigrants has greatly decreased. Between 1830 and 1887 it is calculated that about 4,200,000 emigrants left the country, five-sevenths of whom were bound for the United States of North America. The others went, in varying proportions, to South America, Anstralia, Canada, Africa, and Asia. In 1831–60 about 1,130,000 emigrants left Germany; in 1860–71, 970,000; in 1871–80, 595,150; and in 1881–88, 1,143,570. In 1886 the number was 83,218; in 1887, 103,055; and in 1888, 98,515, besides about 4000 sailing from French ports. By far the largest proportion of emigrants come from the northern parts of the empire: in 1888 the provinces of Posen and West Prassia each contributed over 12,000 to the Prussian total of 63,000.

Bavaria sent 12,200; Würtemberg, 6500; Saxony, 2300. To balance this efflux of native blood, there were, in 1885, 372,792 foreiguers in the German empire, of whom about 120,000 were Austrians. There were 11,155 British subjects in Germany in 1880.

Colonies.—The steady stream of emigration from Germany renders it natural that Germany

should wish to retain as many as possible of her emigrating children under her own flag; hence of late there has been much zeal in Germany for the extension of German territory abroad, and between 1884 and 1889 the following regions have become German possessions or come under German protection:

I. Arrica— Togoland, on the Slave Coast Cameroon	Area in 400 115,000 230,000 60,000 520,000 210,000	Population. 40,000 200,000
II. POLYNESIA— In Marshall Islands. Karser Wilhelm Land, in New Guinea Bismarck Archipelago (New Britain, &c) In Solonon Islands	150 70,300 18,150 8,500	10,000 100,000 188,000 80,000

Education.—Education is more generally diffused in Germany than in any other country of Europe, and is cultivated with an earnest and systematic devotion not met with to an equal extent among other nations. Besides the Academy at Minster (founded 1780; 476 students) and the small Lyceum (founded 1780; 476 students) and the small Lyceum at Braunsherg (1568), which have only the two faculties of Philosophy and Catholic Theology, there are 20 universities: Heidelberg (1386), Würzburg (1402), Leipzig (1409), Rostock (1419), Greifswaid (1456), Freiburg (1457), Munich (1472), Tübingen (1477), Marburg (1527), Königsberg (1514), Jena (1557), Giessen (1607), Kiel (1665), Göttingen (1734), Erlangen (1743), Berlin (1809), Breslau (1811), Halle (1817), Bonn (1818), Strasburg (1872). These institutions embrace the four faculties of Theology, Law, Medicine, and Philoburg (1872). These institutions embrace the four faculties of Theology, Law, Medicine, and Philosophy; in 1889 they had 2260 professors and teachers, sophy; in 1889 they had 2260 professors and teachers, and in 1888-80 (winter session) 28,550 students. Berlin (5790 students), Leipzig (3430), and Munich (3602) are the largest universities; Jena (463) and Rostock (346) the smallest. Of the universities, 14 are Protestant—i.e. in the department of theology they teach only Protestant theology; three are Roman Catholic—viz. Freiburg, Munich, and Witzburg; three—viz. Bonn, Breslau, and Tübingen—are mixed, Protestantism prevailing in the first two, and Roman Catholicism in the last. There are also 16 nolytechnic institutions: 787 commasia. are also 16 polytechnic institutions; 787 gymnasia, realsolulen, &c.; numerous special schools of technology, agriculture, forestry, mining, commerce, military science, &c.; several seminaries for teachers, and for the ministers of different religions of the series of the serie gious denominations; and nearly 60,000 elementary The attendance of children at school, for at least four or five years, is made compulsory in nearly all the German states, and hence the proportion of persons who cannot read and write is exceedingly small. Among the military recruits of 1887-88 only 0.71 per cent. were unable either to read or write. In East Prussia the percentage was 4:16—the highest in the empire. In all the other states, except Mecklenburg-Schwerin (1:27), the number of illiterate recruits was less than 1 per cent. Several of the smaller states had no recruits unable to read and write.

Public libraries, museums, botanical gardens, art-collections, picture-galleries, schools of music and design, and academics of arts and sciences are to be met with in most of the capitals, and in many of the country towns, npwards of 200 of which possess one or more permanently established

theatres. In no country is the book and publishing trade more universally patronised than in Germany, where the chief centres are Leipzig and Stuttgart. The press annually sends forth from 8000 to 10,000 works, while about 3000 papers and journals are circulated throughout the empire. Of the current newspapers a comparatively small number only exert any marked influence, but many of the German scientific and literary periodicals enjoy a world-wide reputation (see BOOK-TRADE, Vol. II. page 315). The censorship of the press was abolished by a decree of the diet of 1848, and freedom of the press, under certain restrictions which were promulgated in 1854, has been introduced.

Religion.—In regard to religion, it may be stated generally that Protestantism predominates in the north and middle, and Roman Catholicism in the south, east, and west, although very few states exhibit exclusively either form of faith. The Protestants belong chiefly either to the Lutheran confession, which prevails in Saxony, Thuringia, Hanover, and Bavaria east of the Rhine, or to the Reformed or Calvinistic Church, which prevails in Hesse, Anhalt, and the Palatinate. A uniou between these two churches has taken place in Prussia. There are six Roman Catholic archibishoprics and eighteen Roman Catholic bishoprics in Germany.

in Germany.

The following is the proportion of the different denominations, according to the census of 1885:

| Protestant | Advance | Catholic Colored | Catholi 1,001,388 278,450 Baden Hesse..... Mecklenburg 643,581 8,005 26,114 161 4,282 381 2,844 75 74,363 20,078 22,554 23,005 1,650 28 1,451 8,252 905 3,852 18,832 5,202 154 5,891 100 Alsace-Loriaine.. 312,041 1,210,825 3,771 30,876 442

Total......20,869,847 16,786,784 125,673 503,172 11,278 Percentage.....02 68 85'82 0'27 1 2 '03

Judicial System.—In terms of the Judicature Acts of 1877 and 1878, a uniform system of law-courts was adopted by the different states in 1879. The appointment of the judges and the arrangement of the courts are left in the hands of the individual federal states, except in the case of the Recksgericht. The Amstsgericht, with one judge, is competent for civil cases not involving more than \$15 value, and for various minor offences. More important criminal cases are tried by the Schaffen gericht, in which two Schäffen (assessors), chosen by rotation from among the qualified private citizens, sit with the judge. It deals with crimes whose punishment is not more than three months' imprisonment or a fine of £30, and with theft, fraud, &e., in which the damage is not more than 25s. Above these is the Landgericht, divided into civil and criminal chambers (Kanmern), and consisting of a president, directors (who preside over the chambers), and ordinary members. In connection with the Landgericht, jury-courts (Schwurgerichte) are periodically held to try the more serious cases. These consist of three judges and twelve jurymen. A concurrent jurisdiction with the Landgericht in commercial matters is possessed by the chambers for commercial cases (Handelssuchen), in which a judge sits as president along with two arbiters (Handelsrichter) appointed for three years from among the qualified citizens. A revising jurisdiction over the courts below is possessed by the Oberlandesgericht, which is divided into civil and criminal senates, each of

Local Case
Salari and
Errint No. Almirah No.
Received on

which must contain four conneillors and a president. The supreme court of appeal for the whole empire is the Reichsgericht at Leipzig, to which appeals lie even from the jury-trials. It possesses an original jurisdiction in the case of treason against the empire. It also is divided into civil and criminal senates, with a general president, senate-presidents, and councillors, appointed by the emperor on the recommendation of the Bundesrath. Seven members are required to be present in order to give a valid decision in any of the senates; and in the planum one-third of the members must be present.

The penal and commercial codes are now uniform throughout Germany; but the Code Civil is still administered in Alsace Lorraine and Rhenish

Stiff Millimstered in Absace-Lorranne and Amelian Prinssia, the Prinssian land laws in the greater part of Prinssia, and German common law in Saxony, parts of Prussia, Bavaria, &c.

Army.—By the constitution of April 16, 1871, the Prussian military system was extended to the whole empire; though certain alterations in the Landwiche service were introduced by the the whole empire; though certain atterations in the Landwehr service were introduced by the Military Organisation Bill of 1888. Every German who is wehrfahig—i.e. capable of bearing arms—inust be in the standing army for seven years (generally his twenty-first to his twenty-eighth year). Three years must be spent in active service (bei den Fahnen), and the remainder in the army of reserve. He then spends five years in the first class of the Landrehr (q.v.), after which he belongs to the second class till his which he belongs to the second class till his thirty ninth year. Besides this, every German, from seventeen to twenty-one, and from thirty-nine to forty-five, is a member of the Landsturm, a force only to be called out in the last necessity. force only to be called out in the last necessity. Those who pass certain examinations require to serve only one year with the colonrs. They are known as cinjahrige Freiwillige. Article 63 of the constitution enacts that the whole land forces of the empire shall form a united army under the command of the emperor in war and peace. The sovereigns of the principal states have the right to select the lower grades of officers, but even their selections require to obtain the approval of the emperor, whose authority is paramount—article selections require to obtain the approval of the emperor, whose authority is paramount—article 64 expressly declaring that all German troops are bound to obey inconditionally the orders of the emperor. The imperial army is divided into 18 army corps, and in 1889, on its peace footing, consisted of 19,457 officers, 472,498 rank and file, 88,283 horses, and about 1500 guns. The grand total of 491,955 men comprises 166 regiments of infantry, 327,930 men; 21 battalions of jäger, or riflemen, 12,219 men; 93 regiments of eavalry 67,370 men; 52 regiments of artillery, 61,600 men; 21 battalions of engineers, 12,906 men; 18 battalions of military train, 6372 men; and 3558 other officers and men. On its war footing, the total is about 2,267,000 men, hesides the Landsturm. The estimated cost of the army for 1889–90 The estimated cost of the army for 1889-90 was £19,531,755 (ordinary), and £3,214,100 (extraordinary).

ordinary).

Navy.—The formation of a German navy, due to the initiative of Prussia, dates from 1848, and of late years rapid progress has been made. In 1889 the imperial fleet consisted of 77 vessels, with a total tournage of 186,196 tons. Of these, 12 were sea-going ironelads, 14 armour-elad boats, 18 frigates and corvettes, 3 gmboats, 7 avisos or despatch-boats, 4 nuarmonred eruisers, fleet was manned by 15,246 seamen and boys, and officered by 10 admirals and 688 other officers, besides 90 surgeons. The seafaring population of Germany are liable to service in the navy instead of in the army. They are estimated at 80,000, of whom 48,000 are serving in the merchant navy at

home, and about 6000 in foreign navies. After three years' active service, four years are spent in the naval reserve and five more in the first class of the Scewehr, which corresponds to the Landwehr of the land forces. Seamen who have not served in the navy belong from seventeen to thirtyone years of age to the second class of the Sewehr. The empire has two ports of war: Kiel
(q.v.), and Wilhelmshaven (q.v.) in the Bay of Jahde on the North Sca; and there is a naval dockyard at Danzig. The estimated cost of the navy for 1889-90 was £2,211,715 (ordinary), and

£343,580 (extraordinary).

Revenue. - The revenue of the German empire is derived (1) from the customs dues on tobacco, salt, and beet-root sugar, which are entirely made over to it by all the states; from those on brandy and malt, which are also assigned by most of the states; from taxes on playing-eards and stamps, from posts, telegraphs, and railways, the imperial bank, and various miscellaneous sources; (2) from extraordinary sources—as votes for public buildings and loans; and (3) from the proportional contributions (Matrikular-beitring) of the various states. The chief items of expenditure are the maintenance of chief items of expenditure are the maintenance of the Reichstag and various government offices, the army and navy, posts and telegraphs, railways, justice, pensions, and other miscellaneous claims. The average income for the five years 1881-82 to 1885-86 was £30,121,470, and the average expenditure £30,564,200. The budget estimates for the four years 1886-87 to 1889-90 are: income, £33,594,915, £47,463,165, £61,296,305, and £48,402,695; expenditure, £34,676,600, £43,846,735, £60,188,440, and £47,267,870. The national debt on March 31, 1888, was £42,561,485; in 1874 it was £235,080. Of the fornur total £36,000,900 represented the funded debt, bearing interest chiefly at 4 per cent. By November 1888 this sum had risen to £40,746,700, and it was estimated that an additional loan of £16,471,787 would be required to meet the additional military expenditure authorized.

neet the additional military expenditure authorised by the law of March 27, 1889.

Social Organisation.—All the states of the empire recognise four distinct orders—viz. the nobility, elergy, burghers, and peasantry, and all distinguish three distinct grades of nobility. The highest of these includes the members of reigning houses, and the descendants of families who belonged at the time of the old empire to the sovereign nobility of the state, and were reichs-unmittelbar, or directly connected with the empire, as holding their domains directly under the emperor, but whose houses have subsequently been mediatised, or deprived of sovereign power in accordance with special treaties between the state and the princes. There are at present fifty princely and fifty-one griefliche (countly) mediatised families, who, in accordance with the act of the diet of 1806, have equality of rank with reigning large and the prince the state of the s ing houses, and enjoy many of the special privileges which were accorded to the high nobles of the empire. The second grade of nobility is composed of counts and barons not belonging to reigning or mediatised houses, whilst the third and lowest grade includes the knights and hereditary

patrimonial proprietors of Germany.

Before we proceed to consider the political organisation of the new German empire, we shall briefly describe—(1) the principal features of the constitution of the old Germanic empire, which was overthrown by the first Napoleon in 1806; and (2) that Bund or federal government which lasted from 1815 to 1866, when Austria was excluded from the Confederation, and the hegemony

of Germany was transferred to Prussia.

The Old Germanic Empire.—The states of this empire comprised three chambers or colleges: (1)

The Electoral College, which consisted of the archi-episcopal electors of Mainz, Treves, and Cologne, and the secular electors, of whom there were originally only four, but whose number was subsequently increased to five, and who at the dissolution of the empire were represented by the sovereigns of Bohemia, Bavaria, Saxony, Brandenburg, and Brunswick Lüneburg or Hanover (see Electors). (2) The College of the Princes of the Empire, who had each a vote in the diet, and were divided into spiritual and temporal princes. (3) The Free Imperial Cities, which formed a college at the diet, divided into two bouches, the Rhenish with four-teen cities, and the Swabian with thirty-seven; each of these had a vote. These colleges, each of which voted separately, formed the dict of the empire. When their respective decisions agreed, the matter under discussion was submitted to the emperor, who could refuse his ratification of the decisions of the dict, although he had no power to modify them. Ordinary meetings were usually summoned twice a year by the emperor, who specified the place at which the sittings were to be held; during the later periods of the empire they were held at Regensburg (Ratisbon). The diet had the right to enact, abrogate, or modify laws, conclude peace and declare war, and impose taxes for the general expenses of the state. The Aulic Chamber, and the Cameral or chief tribunal of the empire, decided in cases of dispute hetween members of the diet. The emperors were chosen by the electors in person or by their deputies; and after their election and coronation, which usually both took place at Frankfort-on-the-Main, the emperor swere to the 'capitulation' or constitution of the empire. After the dissolution of the empire in 1806, its place was nominally taken by the Confied the place at which the sittings were to be held;

empire. After the dissolution of the empire in 1806, its place was nominally taken by the Confederation of the Rhine, which owed its existence to Napoleon, and which lasted till 1815.

Germanic Confederation.—The Germanic Confederation was established by an act of the Congress of Vienna in 1815, on the overthrow of Napoleon. It was an indissoluble union, from which no single state could at its own pleasure retire. Its single state could at its own pleasure retire. single state could at its own peasure retire. Its central point and its executive and legislative powers were represented by the federative diet, which held its meetings at Frankfort-on-the-Main, and was composed of delegates from all the confederate states, chosen, not by the people, but by the various governments. The diet deliberated either in a limited council (the Federative government) or as a general assembly (Plenum). In the limited conneil there were seventeen votes, of which eleven of the principal states had each one, while the remaining states divided the six collective votes between them. The Plennin, which met only when any organic change was to be effected in the dict itself, embraced seventy votes, of which Austria and the five German kingdoms had each four, while the other states had three, two, or one vote each in proportion to their individual importance. It rested with the limited council, which executed the enactments of the Plenum, and despatched the ordinary business of the Confederation, to decide (by a majority of voices) whether a question should be submitted to the Plenum, where it was not debated, but simply decided by a majority of ayes or noes. Austria presided in both assemblies, and had a casting vote in eases of equality. The diet, as a collective body, had the right of concluding peace and alliances, and declaring war; but this power could while a prevised for the majority as power could only be exercised for the maintenance of the independence and external security of Germany and the individual integrity of the several federative states, which on their part were bound to submit to the diet the consideration of all questions in dispute between themselves and other powers. Where such differences could not be settled by the committee empowered by the Plenum to consider them, they were finally referred to a special tri-bunal known as the 'Austrägal' Court, which was composed of several members of the Confederation invested for the time with full powers. From 1866 to 1871 the place of this Bund was held by the North German Confederation, which is described in the historical part of this article.

Present German Empire.—The seventy-ninth article of the constitution of the North German Confederation provided for the admission of the South German states into the new Bund; and the war between France and Germany, which broke out in July 1870, and in which all the German princes and peoples took part, gave an irresistible impetus to the desire for national noity. On the 15th November 1870 the grand-duchies of Baden and Hesse joined the Bund; Bavaria followed on the 23d, and Würtemberg on the 25th of the same month. Shortly after, the king of Bavaria wrote a letter to the king of Prussia, urging him to re-establish the German empire. This brought the question under the notice of the Bund; and on the 10th December 1870 it was agreed, by 188 votes to 6, that the empire should be restored, and that the king of Prussia should be acknowledged hereditary German emperor. The latter solemnly accepted the new dignity at Versailles, 18th Janu-

ary 1871.
The constitution for the new empire was promulgated by an imperial decree of April 16, 1871, and is contained in seventy-eight articles, under fourteen sections. Alsace and Lorraine were fourteen sections. Alsace and Lorraine were brought under its provisions from January 1, 1874. The preamble expressly declares that all the states of Germany form an eternal union for the protection of the territory of the Bund, and for the care of the welfare of the German people. The empire possesses the exclusive right of legislation on all military and naval affairs; on civil and criminal law for general application; on imperial finance and commerce; on posts, telegraphs, and railways in so far as the interests of the national defence and general trade are concerned. Wherever the laws of the empire come into collision with those of particular states of the Bund, the latter must be held as abrogated; and in all disputes that arise among the individual states, the imperial jurisdic-

tion is supreme and final.

There are two legislative bodies in the empirethe Bundesrath, or Federal Council, the members of which are annually appointed by the governments of the various states; and the Reichstag, the members of which are elected by universal suffrage and ballot for a period of three years. The former deliberates on proposals to be submitted to the latter, and on the resolutions received from it. A simple majority is sufficient to carry a vote in the Bundesrath. Acting under the direction of the chancellor of the empire, the Bundesrath, in addition to its legislative functions, represents also a supreme administrative and consultative board, and, as such, has eleven standing committees—viz. for the anny and fortresses; naval matters; tariff, excise, and taxes; trade and commerce; railways, posts, and telegraphs; civil and criminal law; financial accounts; foreign affairs; Alsace-Lorraine; matters affecting the constitution; and the arrangement of business. Each committee consists of representatives of at least four states of the empire, besides the president; but the foreign affairs committee includes the representatives of the kingdoms of Bavaria, Saxony, and Wiirtemberg, and of two other states annually selected by the Bundesrath.

The Reichstag contains approximately one member for every 120,000 inhabitants; in 1889 there

were 397 members. The Reichstag must be convened annually, but cannot be assembled unless the Bundesruth is also in session. Its proceedings are public; the members are unpaid, but enjoy various privileges and immunities. A dissolution of the Reichstag before the end of three years requires the consent of the Bundesrath; and the new election must take place within sixty days, and the meeting of the new Reichstag within ninety days after the dissolution. By a law passed in 1888, to come into force in 1890, the legislative ne 1888, to come into force in 1890, the legislative period has been increased to five years. The Reichstag elects its own president. The members of the Bundesrath may claim a right to speak in the Reichstag; but no one can be a member of both assemblies at once. All imperial laws must receive the votes of an absolute majority of both belier, and to be really must in addition bards. hodies, and, to be valid, must, in addition, have the assent of the emperor, and he countersigned when promulgated by the Reirhskanzler, or chan-cellor of the empire, who is appointed by the emperor, and is ex officio president of the Bundes-

The votes in the two assemblies are apportioned as follows: Prussia has 17 votes in the Bundesrath and 236 in the Reichstag; Bavaria has respectively 6 and 48; Wirtemberg, 4 and 17; Saxony, 4 and 23; Baden, 3 and 14; Meeklenburg-Schwerin, 2 and 6; Hesse, 3 and 9; Oldenburg, Saxe-Weimar, and Hamburg, each 1 and 3; Brunswick, 2 and 3; Saxe-Meiningen, Saxe-Coburg-Gotha, and Abhalt, 1 and 2; and the remainder 1 vote in each assembly. Alsaco-Lorraine has 15 votes in the Reichstag, but in the Bundesrath is represented only by 4 commissioners (Kommissäm) without votes, appointed by the Statthalter. To assist the Reichskanzler in managing imperial affairs, a number of ollices (not ministries) have developed in the course of time for the different departments of state.

According to the eleventh article of the constitution, the German emperor, with the consont of the Bundesrath, can declare war, make peace, enter into treatics with foreign nations, and appoint and receive ambassalors. If, however, the territory of the empire is attacked, he does not require the consent of the Bundesrath to declare war, but can set independently officered in the war, but can aet independently. Changes in the constitution ean be effected only by imperial law, and they are held to be rejected if 14 votes are given against

them in the Bundesrath.

Political Parties.—There is no imperial responsible ministry in Germany, and the government is independent of changes in the relative strength of the various parties in the Reichstag. For years Prince Bismarck formed alliances now with this, Prince Bismarek formed affidices now with char, now with that party, according to the aim he had in view; and his opponents, even when they defeated his measures, had no thought of superseding him in the chancellorship. The chief political ing him in the chancellorship. The chief political parties in the Reichstag may be roughly grouped nuder the names Liberal, Conservative, and Clerical. Of the first, the National Liberals, a party dating from the crisis of 1866, whose object s a united Germany on constitutional lines, were long the most influential supporters of Bismarck. In 1879, however, they differed from him on the questions of the new protectionist and military policies; and in consequence they suffered a severe defeat at the next election. The advanced wing of the Liberal party, known as the Fortschrittspartei, formed a coalition in 1884 with a considerable number of 'Seessionists' from the National Liberals, and founded the present Deutsch-Freisinnige-partei, under the leadership of Eugen Richter, with a radical programme including demands for a responsible ministry, annual budgets, freedom of speech, meeting, and press, and payment of members. The reorganised National Liberal party

once more approached Bismarek, and, having in 1888 joined the Conservatives in support of the government measures, now forms part of the so-called Cartellpartei, or Coalition party. The Conservatives include the Deutsche Konservutiven, a distinctly reactionary group, and the Deutsche Reichs-partei or Frei-Konservativen, best perhaps described as Liheral-Conservatives, aiming at a fair imperial government as the first necessity of their country. The *Centre* or Ultramontane party, organised by Windthorst since 1871, is essentially the Roman Cathulic clerical party, and has offered the most determined and best-organised resistance to Bismarck. A temporary allianec, however, with this party enabled the chancellor to earry his protectionist proposals in 1889. The Elsasser, the French party of Alsace, generally vote with the Centre. Among the smaller parties the most significant is that of the Social Democrats, who, in spite of all the hostile socialist legislation, rose from 2 votes in 1871 to 24 in 1884. The smaller parties, with special and more private views, are known as *Particularisten*; they include the *Poles*, aiming at the separation of Polish Prussia from Germany, Welfen, or Hanoverian royalists, and some individual members. In 1884 the Conservatives had 76 votes; in 1887, 129; the National Liberals, 45 and 99; the Freisinnige, 104 and 32; the Centre, 109 and 98; the Social Democrats, 24 and 11.

See Statistik des Deutschen Reichs, published periodically by the Imperial Statistical Office, and the Statistisches Jahrbuch (annually since 1880). The Jahrbuch for 1889 contains an index to the Statistik since 1871. Kutzen, Das Deutsche Land (3d ed. 1880); Berghaus, Deutschland und seine Bewohner (2 vols. 1860); Daniel, Deutschland und seine Bewohner (2 vols. 1860); Daniel, D. nach seinen physischen und politischen Verhältnissen (2 vols. 5th ed. 1878); Delitsch, Forschungen zur D. Landes- u. Volkskunde (1885); Nenmann, Das Deutsche Reich in Geog., Statist., und Topograph, Bezichung (1872-74), and Geog. Lexikon des D. Reichs (1883); S. Baring-Gould, Germany, Past and Present (2 vols. 1881); Baedeker's Travellers' Handbooks; and the Handbuch für das Deutsche Reich, Kirschner's Staatshandbuch, the Statesmay's Verr-book, and the Almand de Gulha for Statesman's Year-book, and the Almanach de Golha for the current year. On the Constitution, Störk's Hand-buch der Deutschen Verfassung (1884).

History.—The earliest information we have of the Germans, the peoples and tribes who dwelt among the dense forests that stretched from the the Baltie Sea, comes to us from the Danube to the Baltie Sea, comes to us from the Romans, the principal anthority being Tacitus. The term principal authority being Tacitus. The term Germans is of Celtic origin, though its meaning is not precisely known. It was in all probability borrowed by the Romans from the Ganls. Germans were not one homogeneous nation, but a multitude of separate and independent tribes, who had racial origin, language, and similarity in their mode of life for their only links of connec-tion. The first tribes of Germanic race to come into collision with the arms of Rome were the Styria, and Teutones, who in 113 B.C. had invaded Styria, and there met with defeat from the troops of the consul Papirius. The next Roman general who made trial of their prowess was Casar. When in 58 B.C. he began his campaigns in Gaul, he found several hordes of Germans, mostly Marcomanni and Suevi, settled between the Rhine and the Vosges, and even on the western side of these hills. Appended to by the Ganls of those regions to free them from their German oppressors, Casar, in spite of the redoubtable stature and strength of his enemies, and of their personal valour, inflicted a crushing defeat upon their ambitious chieftain, Ariovistus, and chased him and his followers across the Rhine. Then, continuing his eampaign, he drove back (55 B.C.) behind the same river those tribes that had settled on its western side in

Belgium, and even followed them into their original seats in Germany in two short campaigns. The tranquillity which was established ingly Drisus was sent (12 B.C.) at the head of eight legions across the frontier; and in four campaigns he was so far successful that he subdued the Batavians, Frisians, and other tribes as far as the Elbe, and likewise the Chatti on the Main. After the death of Drusns in 9 B.C. Tiberius conquered the Teneteri and Usipetes, who lived on the middle Rhine, and afterwards the Sicambri and others settled on the lands at its month. In 6 A.D. the work was taken up by Varus; but Varus, in attempting to consolidate the Roman power by depriving the Germans of their national institutions and imposing upon them those of the empire, provoked a general revolt of the subject peoples. provoked a general revolt of the singer peoples. The animating spirit of this patriotic movement was Arminins (q.v.), chief of the Chernsei, who not only overthrew Varus, and slew him and his legions (9 A.D.) at one blow in the Teutoburg Forest, but with irresistible claus weep the Romans before him until he had availed them from Garman him until he had expelled them from German soil. The struggle was renewed by Germanieus, who defeated Arminius and averaged the Roman honour, but at length, in 16 A.D., withdrew his legions. Henceforth the Romans contented themselves with guarding their long frontier next Germany; and in this task they succeeded for some time as much by stirring up dissension amongst the chiefs of their foemen as by their own military skill. Yet they managed to bring the Frisians and Bataviaus under their influence, until in 69 a fierce revolt broke out amongst the latter people, a revolt which was only quelled after a terrible struggle. Alout one hundred years later the Germans began to reverse the order of things. In the perial 166-174 Anrelins was engaged in heating back a formidable incursion of the Marcomanni and Quadi into Roman territory. From the 3d century we no longer read of single tribes, but of great confederations of tribes, as the Goths, Alemanni, Franks, Frisians, Saxons, Thuringians, and others. These powerful com-Thuringians, and others. These powerful com-binations began to harass the Romans all along their frontier line, from the month of the Rhine to the middle Dannbe, attacking the towns and forts, and breaking down the walls they had built to keep this boundary. In 375 began the movement before which Rome eventually succumbed. The Huns invaded Europe, and by their coming gave rise to what is known as the 'Volkerwanderungen' or 'Migrations of the Peoples.' The races who lay more and more by those behind, upon whom the full brunt of the Hunnic attack had fallen, and at last they began to pour across the boundary in such broad deep streams that the dams of the Romans were braken completely down before their onrush. Of the history of Germany itself we learn little more that is anthentic until we come down to the times of the Franks, except that the Slavic nations following in the wake of the Huns seized and occupied the lands left vacant by the German emigrants who had gone Romewards, and that of the confederations still remaining at home in their original lands the most important were the Alemaini, the Thuringians, Saxons, Bavarians, and Franks. The historian turns his attention more especially towards the last-named, since by them the kingdoms of France and Germany were subsequently formed. See France, and Franks.

After the gradual expulsion or retirement of the Romans from Germany, the country neces-

sarily became subdivided into numerons petty states, each governed by its own chief. The erection of the Franko-Merovingian empire in France had given preponderance to the Frankish power on both sides of the Rhine, and when Charlemagne succeeded in 771 to the German as well as the Gallie possessions of his father, Pepin the Short, he found hinself possessed of an amount of territory and a degree of influence which speedily enabled him to assert supremacy over the whole of the west of Germany, while his conquests over the heathen Saxons in the north, and the Avars who then held Pannonia in the south-east, extended his German dominions from the North Sea to the Alps, and from the Rhine as far as Hungary. With Charlemagne, who received the imperial crown at the hands of the pope in 800, began the long line of emperors and kings who occupied the German throne for more than a thousand years; and with him, too, ended the stability of the vast fabric which he had reared on the rains of Roman power, for at his death in 814 no member of his family was competent to wield the imperial sceptre, Although in \$43 some portions of his German possessions fell, in accordance with the treaty of Verdun, to his grandson Ludwig, surnamed 'the German,' who was recognised as king of Germany or East Francia, the final and absolute partition did not take place till 887, when Armuf seized the eastern throne. On the extinction, in 911, of the degenerate Carlon winning dynasty in the parson of eastern throne. On the extinction, in 911, of the degenerate Carlovingian dynasty in the person of Ludwig 'the Child,' the provincial rulers, who, together with the archbishops, bishops, and abbots, constituted the chief members of the diet or national assembly, arrogated to themselves (in imitation of the practice of the nobles of the ancient German tribes) the right of electing their consistency who however could not assume the sovercign, who, however, could not assume the imperial title till he had been evoymed by the pope. At this period there were in Germany five nations—the Franks, Saxons, Bayarians, Swabians, and Lorrainers. The Franks, as the descendants of those who had conquered the land and founded the empire, cujoyed a pre-eminence over the others; and hence, on the extinction of the Carlovingian race, the choice of the prince-electors seems to have fallen almost as a matter of course on the chief of the Franks, the Duke of Franconia, who reigned as king of Germany from 911 to 918, under the title of Conrad I. At his own instigation, his rival and adversary, Henry, Duke of Saxony, was chosen as his successor, and proved himself an able and warlike prince. The conquests of this great and warlike prince. prince over the Danes, Slavs, and especially over the terrible Magyars, were emfirmed and extended by his son and successor, Otho I. (936-973), who carried the boundaries of the empire beyond the carried the boundaries of the empire beyond the Elbe and Saale, and who, by his acquisition of Lumbardy, laid the foundation of the relations which existed for many ages between the rulers of Germany and the Italian nation. Otho's coronation-festival was eveniful, as it formed the precedent for the exercise of those offices which, till the dissolution of the empire, were regarded as connected with the dignity of the secular electors; for on that occasion, while the emperor dired with for on that occasion, while the emperor dined with his three spiritual electors, he was waited upon by the secular princes—the Elector of Bavaria (afterwards of Saxony) serving as grand-marshal; of Swabia (afterwards of Bohemia), as grandcupbearer; and of Lorraine (afterwards of Bran-

denling), as arch-chamberlain.

Otho II. (973-983), Otho III. (983-1002), and Henry II. (1002-24) belonged to the Honse of Saxony, which was succeeded by that of Franconia, in the person of Conrad II. (1024-39), an able ruler, who added Burgundy to the empire. His son and successor, Henry III. (1039-56), tempo-

rarily extended German supremacy over Bohemia, Denmark, and Hnngary, while he repressed the insolence and desputism of the great nobles of Germany. And while his stern piety moved him to interfere with force in the strife over the papal chair, he also gained the respect of his contempocmar, he also gained the respect of his contemporaries by his zeal for justice and his valour in the field. The minority of his son and suecessor, Henry IV. (1056-1106), enabled the nobles to recover much of their former power, and to apply a check to the further consolidation of the imperial anthority, which had been considerably extended anthority, they be a secondary to the procedure relicant Henry's constant. under the two preceding reigns. Henry's constant quarrels with the astate Gregory VII. entangled him in difficulties and mortifications, which culmiand the difference in the minimation at Canossa, and only ended with his life, and which plunged Germany into anarchy and disorder. The emperor's most formidable rival, Rudolph of Swabia, was defeated and slain in 1080. With his son and successor, Henry V. (1106-25), who made peace with the panaey by the Concordat of Worms in 1122, the male line of the Franconian dynasty heeame extinct; and after the crown had been worn (1125-37) by Lothair of Saxony, who made a bold attempt to recover some of the prerogatives of which at his election the empire had been deprived through papal intrigues, the choice of the electors, after a season of dissension and intrigue, fell upon Conrad III. (1138-52), Duke of Franconia, the first of the Hohenstaufen dynasty. His reign, in which the civil wars of the Guelphs (q.v.) and Ghihel-lines began, was distracted by the dissensions of the great feudatories of the empire, while the strength of Germany was wasted in the disastrons Crusades, in which Conrad took an active part. On his death the electoral college for the first time met at Frankfort, which retained the honour of being the place at which the savereign was elected and crowned till the dissolution of the empire in the 19th century. Frederick I. (1152-90), surnamed Barbarossa, Duke of Swabia, was, at the recommendation of his uncle Conrad, chosen as his successor, and the splendour of his reign fully warranted the selection. By the force of his character Frederick acquired an influence over the diets which had not been possessed by any of his immediate predecessors, and during his reign many important changes were effected in the mutual relations of the great duchies and counties of Germany, while we now for the first time hear of the hereditary right possessed by certain princes to exercise the privilege of election. Unfortunately for Germany, this great monarch suffered the interests of his Italian dominions to draw him away from those of his own country, whilst his participation in the Crusades, in which both he and the flower of his chivalry perished, was only memorable for the misfortunes which it entailed on the empire. The interval between the death of Frederick Barbarossa (1190) and the necession of Rudolf I. (1273), the first of the Hapsburg line, which, through a female branch, still reigns in Austria, was one of constant struggle, internal dissension, and foreign wars. Individually, the princes of the Hohenstaufen dynasty were popular monarchs, their many noble and chivalrous qualities having endeared them to the people, while one of the race, Frederick II. (1212-50), was, after Charlemagne, perhaps the most remarkable sovereign of the middle ages; but their ambitious designs on Italy, and their constant but futile attempts to destroy the papal power, were a source of misery to Germany, and with Frederick II. ended the glory of the empire, till it was partially revived by the Austrian House of Hapshurg. His son, Conrad IV. (1250-54), with whom the Hohenstanfen line ended in Germany, was succeeded,

after a brief and troubled reign, by various princes, who in turn, or in some cases contem-portneously, hore the imperial title without exer-This cising its legitimate functions or authority. season of anarchy (known as the Great Interregmun) was terminated at the accession of Rudolf I. (1273-91), who, by the destruction of the strong-holds of the nobles, and the stringent enforcement of the laws, restored order. His chief efforts were, however, directed to the aggrandisement of his Austrian possessions, which embraced Styria, Carinthia, Carniola, and Tyrol.

For the next 200 years the history of the German empire presents very few features of interest, and may be briefly passed over. Adolf of Nassau, who was elected to succeed Rudolf, was compelled in 1298 to yield the erown to the son of the latter, Albert I. (1298-1308), whose reign is chiefly memorable as the period in which three Swiss cantons, Unterwalden, Schwyz, and Uri, established their independence. After the murder of Instead their independence. After the number of Albert the throne was occupied in rapid succession by Henry VII. (1308-13), who added Bohemia to the empire, and, conjointly, by Frederick 11I. of Austria and Ludwig IV. of Bavaria (1313-47). Charles IV. (1347-78) of Luxemburg was the successful candidate among many rivals; and, although he attended specially to the interests of his hereditary possessions of Bohemia, Moravia, Silaria and Lutatia he did not entirely represent Silesia, and Lusatia, he did not entirely neglect those of the empire, for which he provided by a written compact, known as the Golden Bull (1356), which regulated the rights, privileges, and duties of the electors, the mode of the election and coronation of the emperors, the coinage, customs, and comof the emperors, the connage, customs, and commercial treaties of the empire, and the rights and obligations of the free cities. His son, Wenceslans (1378–1400), who was finally deposed, bought the royal anthority into contempt, from which it was scarcely redeemed by Rupert of the Palatinate (1400–10). The nominal reign of Sigmund (1410–37), the brother of Wenceslans, would demand no notice was it for the big convection with the notice were it not for his connection with the Conneil of Constance in 1414, at which Huss was condemned, and which was followed by the dis-astrous Hussite wars. The readiness with which Signand lent himself to the interests of Henry V. of England, and of all other princes who ministered to his love of personal display, brought discredit on the imperial dignity, while his dishonourable desertion of Huss will ever attach ignominy to his name. Albert II. of Austria (1438-39), after a reign of less than two years, in which he gave evidence of great capacity for governing, was succeeded by his cousin, Frederick IV. (1440-93), an accomplished but avaricious and indolent prince, whose chief object seemed to be the aggrandisement of the House of Hapsburg, with which the title of emperor had now become permanently connected (see AUSTRIA), while he neglected the interests of Germany collectively, and suffered the Turks to make uncheeked advances upon its territory. Maximilian I. (1493–1519), the son and successor of Fraderials proposed him in few receptors for head of Frederick, resembled him in few respects, for he was active, ambitious, and scheming, but deficient in steadiness of purpose. His marriage with Mary, the rich heiress of her father, Charles the Bold of Burgundy, involved him in the general politics of Enrope, while his opposition to the reformed faith preached by Lather exasperated the religions differences which disturbed the close of his Maximilian had, however, the merit of introducing many improvements in regard to the internal organisation of the state, by enforcing the letter administration of the law, establishing a police and an organised army, and introducing a postal system. With him originated, moreover, the special courts of jurisdiction known as the

'Imperial Chamber' and the 'Anlie Council;' and in his reign the empire was divided into ten and in his reign the empire was divided into ten-circles, each under its hereditary president and its hereditary prince-convoker. Maximilian lived to see the beginning of the Reformation, and the success that attended Luther's preaching; but the firm establishment in Germany of the reformed faith, and the religious dissensions by which its sneeess was attended, belong principally to the reign of his grandson, Charles L., king of Spain, the son of the Archduke Philip and of Josena, the heiress of Spain Archduke Philip and of Josenna, the heiress of Spain, who succeeded to the coppire under the title of Charles V. (1519-56). The management of his Charles V. (1919-96). The management of his vast possessions in Spain, Italy, and the Netherlands, and the wars with France, in which he was so long implicated, diverted him from his German territories, which he committed to the care of his brother Ferdinand. The princes of Germany were thus left to settle their religious differences among themselves, and to quell, maided by the head of the state, the formidable insurrection of the peasants (1524-25), which threatened to undermine the wery foundations of society, and which had followed close upon the nobles' war (1522-23), naised by Uhich von Hutten and Francis von Sickingen in the vain hope of seeming a more united Germany under the emperor. The rising of the lower orders was due to the preaching of the fanatic Minzer, and other leaders of the seet of Anabaptists (q.v.), which had arisen from a perverted interpretation of some of the tenets advanced by Luther. Charles's determined opposition to the reformers rendered all settlement of these religious differences impracticable; and although, by the aid of his ally, Maurice of Saxony, he broke the confederation of the Protestant princes known as the League of Schmalkald, he was forced by his former ally to sign the peace of Augsburg in 1555, which granted tolerance to the Lutherans; and, in his disgust at the complicated relations in which he was placed to both parties, he abdicated in favour of his brother Ferdinand (1556-64), who put an end to much of the religious dissension that had hitherto distracted the empire, by granting entire toleration to the Protestants. Although Ferdinand was personally mild and pacifie, his reign was troubled by domestic and foreign aggressions—the different sects disturbing the peace of the empire at home, while the French and the Turks assailed it from abroad.

During the next fifty years the empire was a prey to internal disquiet. Maximilian II. (1564–76) was indeed a wise and just prince, but the little he was able to effect in reconciling the adherents of the different churches, and in raising the character of the imperial rule, was fatally counteracted by the bigotry and vacillation of his son and successor, Rudolf II. (1576–1612), in whose reign Germany was torn by the dissensions of the opposite religious factions, while each in turn called in the aid of foreigners to contribute towards the universal anarchy which culminated in the Thirty Years' War, begun under Rudolf's brother and successor Matthias (1612–19); continued under Ferdinand II. (1619–37), an able, but cruel and bigoted man; and ended under Ferdinand III. (1637–57), by the treaty of Westphalia, in 1648. The effect of the Thirty Years' War (q.v.) was to depopulate the rural districts of Germany, destroy its conenerce, burden the people with taxes, cripple the already debilitated power of the emperors, and cut up the empire into a multitude of petty states, the rulers of which exercised almost absolute power within their own territories. Leopold I. (1658–1703), a hanglity, pedantic man, did not avail himself of the opportunities afforded by peace for restoring order to the state, but suffered himself to be drawn into

the coalition against France, whilst his hereditary states were overrun by the Turks, and were indebted for their safety to Sobieski, king of Poland. Although success often attended his arms, the cunning of Louis XIV. prevented peace from bringing the emperor any signal advantages; and it was in this reign that Strasburg was attached to the French empire. The reigns of Joseph I. (1705-11) and Charles VI. (1711-40), with whom expired the male line of the Hapsburg dynasty, were signulised by the great victories won by the imperialist general, Prince Engene, in conjunction with Marlborough, over the French, in the war of the Spanish succession (1702-13). But the treaty of Utrecht (1713) brought no solid advantage to the empire. The disturbed condition of Spain and Saxony opened new channels for German interference abroad. Germany was further distracted, after the death of Charles, by the dissensions occasioned by the contested succession of his dangliter, Maria-Theresa, who claimed the empire in virtue of the Pragnatic Sanction drawn up by her father in 1713, and through her of her husband, Francis I. of Lorraine, after their rival, the Bavarian Elector, Charles VII., had by means of Prussian aid been elected in 1742 to the imperial throne. Charles, however, was obliged to cede his crown after a brief occupation of three years. Constant disturbances, intensified during the Seven Years' War (1756-63), when Frederick the Great of Prussia maintained his character of a skilful general at the expense of the Austrians, made the reign of Francis I. (1745-65) one of trouble and disaster. Joseph II., his son (1765-00), during the lifetime of Maria-Theresa, who retained her authority over all the Austrian states, enjoyed little beyond the title of emperor, to which he had succeeded on his father's death. But when he ultimately acquired his mother's vast patrinony he at once entered upon a comsc of reforms, which were, however, premature, and unsuited to the eases to which they were applied; whilst his attempts to re-establi

Leopold I., after a short reign of two years, was succeeded in 1792 by his son Francis II., who, after a series of defeats by the armies of the French Republic, and the adhesion, in 1805, of many of the German princes to the alliance of France, which led to the subsequent formation of the Rhenish Confederation under the protectorate of Napoleon, resigned the German crown, and assumed the title of Emperor of Anstria. (See for further details AUSTRIA, NAPOLEON, FRANCE, PRUSSIA, and the articles on the other German states.) From this period till the Congress of Vienna of 1814-15 Germany was almost entirely at the mercy of Napoleon, who deposed the established sovereigns, and dismembered their states in favour of his partisans and dependants, while he crippled the trade of the country, and exhausted its resources by the extortion of subsidies or contributions. The second peace of Paris (1814) restored to Germany all that had belonged to her in 1792; and, as a reconstruction of the old empire was no longer possible, those states which still maintained their sovereignty combined, in 1815, to form a German Confederation. Of the 300 states into which the empire had once been divided there now remained only 39, a number which was afterwards reduced to 35 by the extinction of several petty dynastics. The diet was now reorganised, and appointed to hold its meetings at Frankfort-on-the-Main, after having been formally recognised by all the allied states as the legislative and exceutive organ of the Confederation; but it failed to satisfy the expectations of

the nation, and soon became a mere political tool in the hands of the princes, who simply made its decrees subservient to their own efforts for the suppression of every progressive movement. The fectival of the Wartburg, and the assassination of Kotzebue, were seized as additional excuses for reaction; and though the French revolution of 1830 so influenced some few of the German states as to compel their rulers to grant written constitutions to their subjects, the effect was transient, and it was not till 1848 that the German nation gave expression, by open insurrectionary movements, to the discontent and the sense of oppression which had long possessed the minds of the people. The princes endeavoured by hasty concessions to arrest the progress of republican principles, and, fully recognising the inefficiency of the diet, they gave their sanction to the convo-cation, by a provisional self-constituted assembly, of a national congress of representatives of the people. Archduke John of Austria was elected Vicar of the newly-organised national government; but he soon disappointed the hopes of the assembly by his evident aftempts to frustrate all energetic action on the side of the parliament, while the speedy success of the anti-republican party in Austria and Prussia damped the hopes of the progressionists. The refusal of the king of Prussia to accept the imperial crown which the parliament offered him in 1849 was followed by the election of a provisional regency of the empire; but as nearly half the members had declined taking part in these proceedings, or in a previous measure, by which Anstria had been excluded, by a single vote, from the German Confederation, the assembly soon lapsed into a state of anarchy and impotence, which terminated in its dissolution. The sanguinary manner in which insurrectionary movements had in the meanwhile been suppressed by Prussian troops both in Prussia and Saxony put an effectual end to republican demonstrations; and in 1850 Austria and Prussia, after exhibiting unutual jealousy and ill-will which more than once seemed likely to end in war, combined to restore the diet, whose first acts were the intervention in Sleswick-Holstein in favour of Denmark, and the abolition of the free constitutions of several of the lesser states. From that period the diet became the arena in which Austria and Prussia strove to seeme the supremacy and championship of Germany; every measure of public interest was made subservient to the views of one or other of these rival powers; and the Sleswick-Holstein difficulties were the principal questions under discussion in the federal parliament, down to the rupture between Prussia and Austria, and the dissolution of the Bund in 1866.

The immediate occasion of the war of 1866 was the difference that arose between Prissia and Austria, after the convention of Gastein (1865), as to the occupation and disposal of the territory taken from Denmark in the short war of 1864 (see SLESWICK). But the real grounds lay in that rivalry between the two states for the leadership of Germany, the germ of which is as old as the time of the Great Elector (see FREDERICK-WILLIAM), and which has shown itself at many epochs of their history. There can be little doubt that the feeling of the German people, as distinguished from the princes and bureaucraey, had, in recent times at least, been in favour of the purely German Prinsia as their leader, rather than Austria. And when the parliament of Frankfort in 1849 offered the imperial crown to the king of Prussia, the unity of Germany might have been secured without bloodshed, had the monarch been less scrupplous, or had he had a Bismarck for his adviser. But that opportunity being let slip, and

the incubus of the 'Bund' being restored, it became apparent that the knot must be cut by the sword.

By the treaty of Gastein Austria and Prussia agreed to a joint occupation of the Elbe duchies; but to prevent collision it was judged prudent that Austria should occupy Holstein, and Prussia Sleswick. Already a difference of policy had begun to show itself: Prussia was believed to have the intention of annexing the duchies; while Austria began to favour the claims of Prince Frederick of Angustenburg. In the meantime, both nations were making ready for the struggle; and Italy, looking upon the quarrel as a precious opportunity to strike a blow for the liberation of Venetia, had secretly entered into an alliance with Prussia.

In the sitting of the German diet, June 1, 1866, Austria, disregarding the convention of Gastein, placed the whole matter at the disposal of the Bund, and then proceeded to convoke the states of Holstein 'to assist in the settlement of the future destination of the duchy.' Prussia protested against this as an insult and a violation of treaty; demanded the re-establishment of the joint occupation; and, while inviting Austria to send troops into Sleswick, marched troops of her own into Holstein. Instead of responding to this invitation, Austria withdrew her forces altogether from Holstein, under protest; and then, calling attention to this 'act of violence' on the part of Prussia, proposed that the diet should deeree 'federal execution' against the enemy of the empire. This eventful resolution was carried by a great majority on the 14th June 1866; Hanover, Saxony, Hesse-Castel, and Hesse-Darmstadt voting for it. The resolution having passed, the Prussian plenipotentiary, in the nume of his government, declared the German Confederation dissolved for ever, and immediately withdrew.

Thereupon identical notes were sent by Prussia to the courts of Saxony, Hanover, and Hesse-Cassel. The terms were not accepted, and the Prussian the terms were not accepted, and the Prussian troops at once took military possession of the three kingdoms without resistance. War was now declared against Austria; the Prussian host, numbering in all 225,400 men, with 774 gnns, invaded Bohemia at three several points. The Austrians, who had been surprised in a state of ill-organised mireadiness, had assembled an army of 262,400 men and 716 gius; and the greater portion of these were stationed, under General Benedek, behind the Riesengebirge, expecting the attack from Silesia. The Prussian armies meanwhile crossed the Erzgebirge without opposition, drove the Austrian army steadily and quickly back with heavy losses, and, after effecting a junction, moved steadily forward to meet the Austrian army, now concentrated between Sadowa and König-Here, on July 3, was fought the decisive The Austrian cavalry made heroic efforts griitz. Inttle. to turn the tide of victory; but the stern trained to turn the title of victory; but the stern trained valour of the Prussians, armed with the till then little known breech-loading 'needle-gun,' was invincible, and the Austrian army was broken and dissolved in precipitate flight. The Prussians lost upwards of 9000 killed and wounded; the Austrian loss was 16,235 killed and wounded, and 22,684 prisoners. After this decisive defeat, which is known as the battle of Königgritz or Sadowa, all hope of staying the advance of the Prussians with the army of Benedek was at an end; a truce was asked for, but refused; and not till the victorious Prussians had pushed forward towards Vienna, whither Benedek had drawn his beaten forces, was a truce obtained through the agency of the emperor of the French, the peace of Prague (August 20). Italy (q.v.), though more than half-inclined to stand out for the cession by Austria of

the Trentino, as well as Venetia, reluctantly agreed

to the armistice (August 12).

A brief campaign sufficed for the defeat of the A brief campaign sufficed for the defeat of the minor states of Germany that had joined Austria—viz. Bavaria, Wurtemberg, Baden, and Hesse-Darmstadt; and, after peace had at last been arranged, some of them were forced to submit to a certain loss of territory. Saxony only escaped incorporation with Prussia through the resolute opposition of Austria supported by France; but the little kingdom, like all the other states that had taken as a second to pay a heavy war indemnity. Even the little principality of Reuss had to pay 100,000 thalers into the fund for Prussian invalids. The states north of the Main which had taken up arms against Prussia were completely incorporated—viz. Hanover, Hesse-Cassel, Nassau, Frankfort, and a small portion of Hesse Darmstadt, as well as Sleswick-Holstein and Lauenburg; and the other states north of the Main were united with Prussia in a confederacy of a nuore intimate nature than before existed, called

the North German Confederation.

Austria, by the treaty of Prague (20th August 1866), was completely excluded from participation in the new organisation of the German states, and formally agreed to the surrender of Venetia to Italy, to the incorporation of Sleswick Holstein with Prussia, and to the new arrangements made by Prussia in Germany. A portion of the fifth article of this treaty secured that, if the 'inhabitants of the northern districts of Sleswick declare, by a free vote, their desire to be united to Denmark, they shall be restored accordingly; but this was withdrawn in 1878 by secret treaty between Austria and Germany. Though losing no territory to Prussia, Austria had to pay 40 millions of thalers for the expense of the war.

The North German Confederation, as thus constituted appeared a common realisation of the second control of the constituted appeared to the constituted appeared to

stituted, possessed a common parliament, elected by universal suffrage, in which each state was re-presented according to its population. The first or constituent parliament met early in 1867, and adopted, with a few modifications, the constitution proposed by Count Bismarck. The new elections then took place, and the first regular North German parliament met in September 1867. According to this constitution, there was to be a common army and fleet, under the sole command of Prussia; a common diplomatic representation abroad, of necessity little else than Prussian; and to Prussia also was entrusted the management of the posts and telegraphs in the Confederation,
The southern German states which up to this

point had not joined the Bund, were Bavaria, Baden, Würtemberg, Hesse-Darmstadt, and Liechtenstein, with a joint area of 43,990 sq. m., and a total population (1866) of 8,524,460. But, though these states were not formally members of the Bund, they were so practically, for they were bound to Prussia by treaties of alliance offensive and defensive so that in the event of a wear the and defensive, so that in the event of a war the

king of Prussia would have at his disposal an armed force of upwards of 1,100,000 men.

During the next few years the North German Confederation was employed in consolidating and strengthening itself, and in trying to induce the southern states to join the league. The Zollverein (q.v.) was remodelled and extended, until by the year 1868 every part of Germany was a member of it, with the exception of the cities of Hamburg and Bremen, and a small part of Baden. This paved the way for the formal entrance of the southern states into the confederation; but they still hung back, though the ideal of a united Germany was gradually growing in force and favour.

In the spring of 1867 a war between Prussia and France seemed imminent, from difficulties arising

out of the occupation of Luxemburg by the former; but by the good offices of the British government was assembled at London, at which an arrange-ment satisfactory to both nations was amically agreed upon, Luxemburg remaining in the possession of the king of Holland. It was evident, how-ever, that hostilities had only been postponed, and on both sides extensive military preparations were carried on.

In 1870 the long-threatened war between Prussia and France broke out. On July 4 of that year the provisional government of Spain elected Prince Leopold of Hohenzollern, a relative of King William of Pressia, to fill their vacant throne. This step gave the greatest umbrage to the French government; and though by the advice of William I. of Prussia Prince Leopold resigned his candidature, it was not satisfied, but demanded an assurance that Prussia would at no future period sanction his claims. This assurance the king refused to give; and on the 19th of July the emperor of the Freuch proclaimed war against Prussia. Contrary to the expectation of France, the southern German states at once decided to support Prussia and the northern states, and placed their armies, which were event-

at the disposal of King William.

By the end of July the forces of both countries were congregated on the frontier. Napoleon, however, lost a fortnight in delays after the declaration of war, and it was discovered that the French army was by no means in a state of satisfactory preparation, while the Germans were splendidly organised, The result was and much superior in number. that the French, instead of marching to Berlin as they anticipated, never crossed the Rhine, and had to fight at a disadvantage in Alsace and Lorraine.

On August 2 the French obtained some trifling success at Snarbrück, but the rapidly following battles of Weissenburg (August 4), Wörth, and Spicheren (both August 6) were important German victories. The German advance was hardly checked for a moment, though the losses on both sides were very heavy. The battle of Gravelotte, in which King William commanded in person, was fought on the 18th; and, though the Germans suffered immense loss, they were again victorious, and forced Bazaine to shut himself up in Metz. The Emperor Napolcou and Marshal MacMahon in rain attempted to proceed to the relief of Bazaine. They were surrounded at Sedan, and completely defeated with heavy loss. The emperor surrendered on the 2d September, with his whole army, about 90,000 men, and was sent as a prisoner into Germany. By the 19th of September the Prussians had reached Paris, and commenced a vigorous siege. Strashurg capitalated on the 27th after a severe bombardment; and on 28th October Bazainc surrendered Metz with an army of 6000 officers and 173,000 men, 400 pieces of artillery, 100 mitraillenses, and 53 eagles. Verdun capitulated on the 8th November; Thionville followed on the 24th; after which there were several capitulations of lesser

importance.

The French made extraordinary efforts to raise armies and relieve Paris, but, with the exception of a momentary gleam of success on the Loire, they met with nothing lnt severe defeats. Of these may be mentioned the lattle of December 3 in the Forest of Orleans, and that of Le Mans, January 12, in which contests Prince Frederick-Charles took altogether 30,000 prisoners. After numerous unsue-cessful sorties, and enduring great sufferings from famine, Paris surrendered on the 29th of January, and the war was virtually at an end. The French army of the east, 80,000 strong, under Bourbaki, was compelled to retire to Switzerland on the 31st.

By the peace of Frankfort (May 10, 1871) France was condemned to pay a war indemnity of 5 milliards of francs, or £200,000,000; and the province of Alsace, along with the German part of Lorraine,

was ceded to Germany.

A very important result of the war was to complete the fusion of the northern and southern states of Germany. The southern states joined at once in the war against France; in November of 1870, Baden and Hesse leading the way, they all became members of the German Confederation; and next month the re-establishment of the German empire was almost manimously resolved, with the king of Prussia as hereditary emperor. It was at Versailles, on 18th January 1871, that the king was proclaimed emperor of Germany.

The new German empire set vigorously to work The new German empire set vigoronsiy to work to organise itself as a united federation, under the skilful leadership of Prince Bismarck, who was appointed Reichskanzler or Imperial Chancellor. Almost at once it found itself involved in the ecclesiastical contest with the Church of Rome, known as the 'Kulturkampf,' which had previously have in Pressing. The origin of the struggle was begun in Prussia. The origin of the struggle was an effort to vindicate the right of the state to interfere, somewhat intimately, with the behavionr, appointments, and even educational affairs of all religious societies in the country. The Jesuits were expelled in 1872, and Pope Pius IX. retorted were experied in 1872, and Pope Plus IX. retorted by declining to receive the German ambassador. The famous Falk or May Laws were passed in Prussia in 1873-4-3, and some of their provisions were extended to the empire. Several German prelates, refusing obedience, were expelled from Germany; and the disorganisation in ceclesiastical efficies because a serious that the Reighburg present affairs became so serious that the Reichstag passed a law in 1874 making marriage a civil rite. pope issued an encyclical declaring the Falk laws invalid, and matters scentcd for a time to be at a deadlock. On the election of a new pope, Leo XIII., in 1878, attempts were made to arrange a compromise between the empire and the papal see. Falk, the Prussian 'Kultus'-minister, resee. Falk, the Prussian 'Kultus'-minister, resigned in 1879, and certain modifications were made in the obnoxious laws in 1881 and 1883. took a further step towards Canossa in 1885 when he proposed the pope as arbiter between Germany and Spain in the dispute as to the possession of the Caroline Islands; and he practically owned himself beaten in the concessions which he granted in revisions of the politico-ecclesiastical legislation in 1886 and 1887. Another semi-religious difficulty which demanded government interference was the social persecution of the Jews (*Judenhetze*), which reached a climax in 1880-81.

In more strictly political affairs the rapid spread of socialism excited the alarm of the government. Two attempts on the life of the emperor (in May and June 1878) were attributed more or less directly to the Social Democrat organisation, and gave the signal for legislative measures conferring very extensive powers upon the administration to be used in suppressing the influence of socialism. These socialist laws, though limited in duration, have invariably been renewed (sometimes with added stringency) before their validity expired; in 1889 several of the most important towns of the empire were in what is called 'the minor state of siege' for police purposes, and a new permanent socialist law was carried by government in November of that year. A plot, happily futile, to blow up the emperor and other German rulers at the inauguration of the National Monument in the Niederwald in 1883 was considered by government to justify its repressive measures. Prince Bismarek, however, was not content with repressive measures; he has endeavoured by improving the condition of the working-classes to cut the ground from beneath

The the feet of the socialistic propagandists. acknowledgment in the emperor's message to the Reichstag in 1881, that the working-classes have a right to be considered by the state, was followed hy laws compelling employers to insure their workmen in ease of sickness and of accident, and by the introduction (1888) of compulsory insurance for workmen against death and old age—measures that have been by some called 'state-socialism.'

The energetic commercial policy of government also, which since 1879 has been strongly protectionist, has its springs in similar considerations; and the recent colonial policy, which began in 1884 with the aequisition of Angra Pequeña, may be considered to be stimulated partly by the desire to gratify the national self-respect, and partly to provide new outlets under the German flag for the surplus popu-lation, and new markets for the home manufactures. None of the German colonies as yet, however, either in Africa or the Pacific Ocean, have proved of any great commercial value. The assembling of the Congo Congress at Berlin in 1885 fitly marked Germany's admission to the list of colonial powers. On the maintenance and improvement of the army and navy the German government has bestowed the most unremitting care, urged especially by the attitude of the 'Revanche' party in France, though hitherto the imperial policy has been entirely pacific.

Considerable parliamentary friction has been caused more than once by the unwillingness of the Reichstag to vote military supplies to the amount and in the manner demanded by the emperor and chancellor. The latter desire to have practically a free hand in military matters, while the national parliament secks to exercise a constitutional control over the army resembling that illustrated in Great Britain by the annual Mutiny A compromise was effected in 1874 in virtue of which the military strength was fixed and the of which the military strength was fixed and the supplies granted for periods of seven years at a time. In 1886 the government proposed to terminate the current Septennat in 1887 instead of in 1888, and to immediately add largely to the peace strength of the army. On the rejection of the bill the Reichstag was dissolved (January 1887) by the emperor and an appeal made to the country. The Iron Chancellor still possessed the confidence and the gratitude of the people, and the new elections in February 1887 resulted in a the new elections in February 1887 resulted in a crushing defeat for the opponents of the government, notably the Freisinnige and the Social Democrats. One of the most remarkable features of this election was a letter written by the pope in favour of the army bill, for which he subsequently received a quid pro quo in a further modification of the May laws. The Military Septennate Bill was immediately passed, and was the property of the pr followed in 1888 by a Military Organisation Bill, which made several changes in the conditions of service in the landwelr. The subsequent budgets show an enormous increase in the extraordinary military expenditure. While thus secking peace by preparing for war, Germany has not failed to use diplomacy for the sance end.

A personal meeting of the emperors of Germany, Austria, and Russia in 1872 was considered a proof of a political alliance (*Dreikaiserbund*); and, when Russia drifted somewhat apart from Germany in 1878, an offensive and defensive alliance was formed between Austria and Germany in 1879. afterwards entered this Triple Alliance. Germany influence on the Eastern Question was recognised in 1878, when the plenipotentiaries of the powers met at the Congress of Berlin.

On 9th March 1888 the Emperor William I. died. His son Frederick, at that time suffering from a cancerous affection of the throat, immediately issued a proclamation, in which he promised to consider

'new and unquestionable national needs,' and it was understood and to some extent felt that a more liberal era had commenced. The new emperor, however, died on 15th June, and William II., his son, who succeeded, at once recurred to the policy of William I. and Prince Bismarck. Much painful excitement was caused by a medical dispute as to the nature and cause of the late emperor's fatal illness, which speedily developed into a party question, discussed on both sides with virulent acrimony. The latter part of 1888 and the year 1889 were devoted by the young emperor to visiting the courts of several of his fellow-sovereigns in Europe. Germany continued to extend her colonial empire, not, however, without coming to blows with the natives; and in Samoa became temporarily involved in hostilities with one of the chiefs. Difficulties on the east coast of Africa led in 1888 to a blockade by the British and German fleets to prevent the importation of arms and to check the slave-trade. This lasted until October 1889.

Slave-trade. This lasted until October 1889.

See Monumenta Germanice Historica, edited by Pertz, We, a national work begun in 1819 and still unfinished; Deutsche Geschichte, by Dahn, Dove, &e., in Giesebrecht's Geschichte der Europaischen Staaten (Gotha, 1885 et s.g.); W. Menzel, Geschichte der Deutschen (5th ed. 5 vols. Stutt. 1855; Eng. trans. Lond. 1848-49); D. Muller, Geschichte des Deutschen Volks (11th ed. Berlin, 1884); Stacke, Deutsche Geschichte (Leip. 1880-81); Treitschke, Deutsche Geschichte (Leip. 1880-81); Treitschke, Deutsche Geschichte im Men Jahrhundert (5 vols. Leip. 1870 et s.g.); Ranke, Deut. Geschichte der Gegenwart den annual historical register; with a résumé translated into English by Peters, 1876). Also works by Luden, K. B. Menzel, Leo, Waitz, Souchay, Sugenheim, &e.; see also under Friederick the Gerly, Thiery Years' War, Bisyarek, and other special articles.

also under FREDERICK THE GREAT, THRICTY YEARS' WAR, BISMARCK, and other special articles.

Works in English: J. Bryco, Holy Roman Empire (7th ed. 1884); J. Sine, History of Germany (1874); J. Sine, History of Germany (1874); S. Baring-Gould, Germany, Present and Past (2 vols. 1870); Baring-Gould and Gilman, Germany (1886, 'Story of the Nations' series); S. Whitman, Imperial Germany (1889); Official (German) Account of Franco-German War, translated by Major Clarke (1872-84); Seeley's Life of Stein (1879); and see under special articles.

under special articles.

LANGUAGE AND LITERATURE,-The numerous dialects which were spoken by the different confederacies and tribes of ancient Germany were all derivatives from one branch of the Aryan or Indo-Germanic family of languages, which separated from the parent stock at a very early period, although subsequently to the separation of the Collic. We can trace the co-existence of the two branches of Tentonic speech known as Low German and High German as far back as the 7th century, but there is no evidence to show that they existed as common uniform languages, from which their variously modified dialects were respectively derived. According to Max Miller, there nover was one common Tentonic language, which diverged into two streams; while the utmost we can venture to assert in regard to the various High and Low German dialects is that they respectively passed at different times through the same stages of grammatical development. The High stages of grammatical development. German branch-which was spoken in the dialects German branch—which was spoken in the dialects of Swabia, Bavaria, and Franconia—may be classified under three periods—the Old High German, dating from the 7th century and extending to the period of the Crusades, or the 12th century; the Middle High German, beginning in the 12th century and continuing till the Reformation; and the New High German, dating from Luther's time to our own days. This New High German does not represent the victory of any one High German not represent the victory of any one High German dialect over the others; it is rather the result of a compromise, which arose in the public tribunals

Luther found this compromiseof the empire. speech hest suited to his purpose in translating the Bible, and his selection of it effectually con-firmed it in its literary supremacy. The chief firmed it in its literary supremacy. The chief modern High German dialects are the Bavarian, spoken with variations in Bavaria, Salzburg, Tyrol, Upper and Lower Austria, and Styria; Swabian, spoken in Wurtemberg and the adjacent parts of Bavaria; and the Alemannic, spoken in Alsae, the south of Baden, and German Switzerland. The Saxon, Thuringian, Silesian, Franconian, and other High German dialects are grouped together as Middle Cannon dialects. Each of these gether as Middle German dialects. Each of these has a living literature of its own. Low German embraced two main branches, Lower Franconian and Old Saxon. The former, in which we have a fragment of a Oth-century translation of the Psalter, developed a tolerably rich literature in the 13th century, which subsequently gave bith to the Dutch and Flemish tongues. The oldest literary monument of Old Saxon also belongs to the 9th century; it is a Christian epic known as Der Heliand (q.v.)—i.e. The Healer or Saviour. Old Saxon developed into Middle Low German after the 13th century, with a copious enough literature, of which Remeke Vos (corra 1490), a translation from when *Icentice* i is the most important role; and the Dutch branch, is the most important role; and there are traces of popular Low German literature down to the 17th century. The chief extant dialects are the Frisian (q.v.) and Platt-Dentsch (q.v.). In addition to the various dialects which are companyly included maker the backs of Birch are commonly included under the heads of High and Low German, an important evidence of the from the High and Low groups has been preserved to us in the Gothic translation of the Bible, which was made in the 4th century by Bishop William Southeast Programme Translation of the Bible, Ulfilas. See Goths, Philology.

The diffusion of Christianity among the Germanic tribes had the effect both of suppressing the use tribes had the effect both of suppressing the use of the Itnnic characters that had been common to them and of changing the character of their literature, for, instead of the heroic sagas and 'beast-epics' (Theor-epos) of a sanguinary paganism, scriptural paraphrases, legends, and hymns were now selected; while the ancient system of alliterative states the street of the property of the street of the tion by degrees gave place to the rhyming arrangement of the Latin versification common in the early periods of the middle ages. Charlemagne himself made a collection of German popular poetry; and under his successors in the 9th and 10th centuries some of the heroic epies dating from heathen times were written down (e.g. the Hillebrandslied), while the matter of others received a Latin dress at the hands of monkish poets. Under the Saxon emperors Latin because the Under the Saxon emperois Laum became are language of the court, the church, and the law, while German was left entirely to the people, down to the first flourishing period of German poetry under the emperors of the Hohenstanfen line. The Italian wars of this dynasty, the stirring events of the Crusades, and the intercourse with the chivalry of France and Italy kindled a love for literature and romance in the princes and nobles of Germany. The vernacular dialects were nobles of Germany. The vernacular dialects were once more used for literary purposes, especially the Swabian or court-speech. Many, both nobles and men of lower degree, belonged to the order of the Minnesanger (or Singers of Love), who rouncd from eastle to eastle and from court to court, exhausting their ingenity in devising new presentments of their usual subject, the romantic passion of love, and in inventing new and elaborate forms of versification. The epic subjects chiefly selected during the 13th and 14th centuries, by both courtly and popular singers, were based on the history of Troy, the deeds of Alexander the Great, the legendary lore of Charlemagne and his paladins, and King Arthur and his knights, and of the Sangrael; and it is to this period that we must refer the Nibelungen Lied and Gudrun, which rank as the greatest treasures of German national literature. It was to these tales of Parzival, Lohengrin, and the Nibelungen that Richard Wagner turned in his efforts to create a national school of musicdruma in the 19th century. Among the most successful romantic and cpic poets and minnesingers belonging to the Swabian period we singers betonging to the Swidian period we may specially indicate Heinrich von Veldeke, Gottfried of Strashurg, Ulrieh von Lichtenstein, Hartmann von der Aue, Neidhart of Bayaria, Wolfram von Eseleubach, Walther von der Vogel-wilde von Heinrich, Walther von der Vogel-wilde von Heinrich und Heinrich von der Vogelweide, and Heinrich von Ofterdingen. The Krieg anf der Wartburg, which has been classed among the didactic poems of this age, relates a mythical contest of poetie skill between the three last named. The taste for the Thier-epos received a new impetus among the people in the middle of the 12th century by the re-translation, from the French into German, of the ancient poem of Reinhard Fuchs, which, according to the distinguished philologist Jakob Grimm, originated with the Frankish tribes, who carried it with them when they crossed the Rhine and founded an empire in Gaul, and from whom it was diffused among the neighbouring tribes of northern France and Flanders. German now began to be used for public proclamations and in collections of laws, of which the Sacksenspiegel (1230) and t Schwabenspiegel (1270) are the most noteworthy.

Schrüdenspiegel (1270) are the most noteworthy.

The period which succeeded the decline of chivalry was marked by a thorough neglect, among the higher classes, of national literature, which thus fell into the hands of the people. Yet some few chronicles, among which may be mentioned those of Lindnerg, Alsace, and Thuringia, were composed in the century from 1330 to 1430. This was the age of the Meistersanger, or arism nots, who formed themselves into anily. artism-poets, who formed themselves into guilds like their trade guilds, and composed their verses in conformity with the strict guild rules, 'Meister-gering' was at its zenith at the era of the Reformation; its most famous representative was Haus Sachs, the shoemaker of Nuremberg, who also wrote epics, fables, and dialogue pieces. The most honourable place among the pioneer cultiva-tors of German prose-writing belongs to Meister Eckhart, Tauler, Suso, and their followers, the mystics. To this age belongs also the great mass mystics. To this age belongs also the great mass of the *Volkslieder*, or national ballads, in which Germany is specially rich; the fables and satines of Brandt (*Narrenschiff*, or *Ship of Fools*) and Murner, and the romances of the satirist Johann Fischart. Most of the Volksbucher too, such as Die Melusine, Die Halmonskinder, Kaiser Octavianus, Wigalois, Tyll Eulenspiegel, Dr Faust, and Die Schildburger, were written in the 15th and 16th centuries to meet the demand of the people for imaginative literature. The mysteries and passion-plays, which were at their height in the 15th century, and still linger at Obermannergau, in Upper Bavaria, and one or two other places, may be said to have given origin to the German drama, which numbered among its earliest cultivators Sachs, Rebhuhn, and Ayrer. The close of the 15th century produced several satires on the clergy and numerous theological writings for and against the tottering power of the Romish Church.

The writings of Luther, particularly his translation of the Bible, which fixed a literary language for the Germans, and the works of Ulrich von Hutten, Zwingli, and of many of the other reformers, were, however, the most important events in the history of German literature from the close of the 15th to the middle of the 16th century. But Luther addressed himself to the minds of his countrymen

not merely through his polemical writings, but also by those noble hymns which, since his day, have constituted one of the greatest literary treasures of the kind. Many beautiful Kirchen-lieder, or church songs, were composed during the next centuries; to the 17th belong those of Gerhardt, Pranek, and Scheffler, who may be counted among the best burner with the least burner with the least burner with the counted among the best hyron-writers of Germany. Nor should the Roman Catholic hymns of Angelus Silesius be passed over. The example of Luther as a writer of prose German was landably followed by Sebastian Franck in his historical books, by the mystic Jacob Bohme, and Arndt, the most widely read religious writer of the 16th century.

The fervent effusions of the devout and eloquent reformers were followed by a period of

literary degeneration and stagnation, which is in a great measure to be ascribed to the demoralising effects of the Thirty Years' War, when Germany was a prey to all the evils inseparable from civil was a prey to an interference. The indirect result of this period of anarchy was to quench the national spirit and vitiate the popular taste; for, while the petty courts aped the habits, language, and literature of Versailles, the lower orders forgot their own literature, with its rich treasures of legends, tales, and ballads, and acquired a taste for the coarse camp-songs imported by foreign mercenaries, and the immoral romances borrowed from impure French and Italian sources. Almost the only names that break this barren wilderness are Moscherosch, a satirist; Grimmelshansen, who has left vigorous pictures of the Thirty Years' War; and Abraham a Sauta Clara, a satirical preacher, possessed of both wit and humour.

What is known as the first Silesian school of German poetry was formed under the influence of the correct but cold Opitz (1507–1639); and he was staunchly supported by the lynic poet Fleming and the epigrammatist Logan. The succeeding second Silesian school, headed by Hoffman you Hoffmanson Walden and the infants in the infants University. waldau, sought inspiration in the inferior Italian poets, and produced affected and extravagant pastorals. But, on the whole, the study of the national literature was neglected, and, although a host of learned societies were formed whose professed object was to purify and elevate the professed object was to parry and elevate the public taste, the results were lamentably unsatisfactory. The poems of Hagedorn (1708-54) and Haller (1708-77) struck a truer and more natural note. But it was not till Gottsched (1705-66) succeeded, in his Critical Art of Poetry, in drawing attention to the turgid pedantry and artificial stillness of the classicist school that a better taste was awakened. In opposition to the Leipzig school, of which Gottsched was the centre, there arose the Swiss or Zurich school, in which Bodmer and Breitiuger were the leaders. An adverse criticism by Gottsehed of Bodmer's translation of Paradisc Lost precipitated a controversy, known as the Bodmer Streit. The Leipzig school attached all importance to the purely intellectual and mechanical correct ness of poetry; while Bodmer and his disciples eonsidered rather the imaginative and emotional clements. As more or less the outcome of this contest arose the Saxon school, the leading member of which was the hymn-writer and fabulist Gellert, who for some years posed as the literary dictator of Germany; the Halle school with Gleim at its head; and the German asthetic school, under the guidance of A. Baumgarten.

In the end of the 17th century German philosophy first lifted up its head in the writings of Leibnitz, C. Wolf, and Thomasius. Rabener and other contributors to the Bremer Beitrage, a group of lyric and dramatic writers who flourished in the beginning of the 18th century, were perhaps the first to bring literature

again into immediate touch with popular life. But it is with the names of Klopstock, Lessing, Wieland, and Herder that the brilliant epoch of modern German literature begins. Their influence was alike great and varied; for, while Klopstock's poem of the Messich, and his Odes, in which he had taken Milton as his model, re-echoed the tender piety of the old reformers, and were so thoroughly German in their spirit that they at once met with an enthusiastic response in the hearts of the people, Lessing's comedy of Minna ron Barnhelm and his drama of Nathan der Weise may be said to have created anew the dramatic art in Germany. Wieland, on the other hand, was the complete antithesis of Klopstock, although, like Klopstock and Lessing, he was the founder of a new style. He gave a graceful flexibility to German diction which it had never before been made to assume, imparted to his numerons tales and romances an undisguised sensuous unaterialism, which, like his style, had been borrowed from the French philosophers of his day, and thus introduced into the language and literature of Germany the germs of many defects, as well as graces, to which they had hitherto remained strangers. Herder is the typical representative of those who resorted for their inspiration to the simplicity of the Volkslieder and the poetry of nature and of the Orient. His predominant tendencies are indicated in his favourite motto, 'Light, love, life.' Aud he also did admirable work as a philosopher and critic. In fact, his philosophical critiques of foreign and German literature contributed materially to the complete literary revolution which ushered in the modern period of German poetry. The influence exerted on German literature by these writers, who may be regarded as its regenerators, was soon apprecishe in every branch of knowledge. The Swiss Salomon Gessner shows some literary kinship with Klopstock in his sweetly sentimental idylls. Blumaner and Kortum, seeking to perpetuate the irony of Wieland, made travesty of more serious effusions. And it was in the same vein, but seasoned with stronger satire, that Lichtenberg wrote. From the impulse communicated by Lessing came the critical resthetic writings of Winekelmann, and the books of men like Zimmermann (author of On Solitude) and Moses Mendelssohn. The aims which Herder had set before him were adopted by a hand of writers whose chief characteristics conferred upon the age they lived in the name of the Sturm-ind-Drang period. But the poetic spirit raged in them too violently and refused to be subraged in their too violently and reinsed to be subjected to the laws and restraints of artistic production. Klinger, one of whose dramas gave title to the school, and 'Maler' Müller were the champions of the movement. Hamann, in spite of his oracular and enigmatical utterances, had much in common with this school, though he did not belong to it.

Among the galaxy of great names which have imparted renown to the literary and scientific annals of Germany during the last hundred years we can only instance a few of the principal writers who have more especially enriched the several departments of learning with which they have been associated. Philosophy, which originated, as stated, with Leibnitz (1646-1716), who, however, wrote in Latin and French, assumed a degree of individuality and completeness through the intellectual acumen and subtle analysis of Kant, Fichte, Schelling, and Hegel which have no parallel in any other country. Other names worthy of mention in this department are Fries, Jacobi, Herbart, Schopenhauer, Zeller, Feuerbach, Baader, Ed. von Hartmann, Lotze, Haeekel, Fechner, Wundt, and Plieiderer. In theology Reinhard, Paulus, Schleiermacher, De Wette, Marheineke, Neander, Julius Müller, Lücke, Baur,

Strauss, Möhler, Döllinger, Ewald, Hase, Lipsius, Domer, Ritschl, Wellhausen, Holtzmann, and a host of others have infused new life into biblical inquiry. Invaluable results have been attained by the philological and critical researches of F. A. Wolf, Hermann, Müller, J. and W. Grimm, Bopp, Lassen, Gesenius, Schlegel, W. Humboldt, Lepsius, Bunsen, Von der Hagen, Lachmann, Sinnock, Moritz Haupt, Benfey, Pott, Schleicher, Steinthal, Diez, &c. In archaeology, history, and jurisprudence all nations owe a debt of gratitude to Winckelmann, Heeren, Lobeck, Von Raumer, Schlosser, Von Hammer, Gervinns, Dahlmann, Waitz, Ranke, Bluntschli, Niebnhr, Mommsen, and Duncker.

In poetry and belles-lettres the name of Goethe is a host in itself. In his Leiden des Jungen Werther ('The Sorrows of Young Werther') he earlied the sentimental tendencies of the Sturm-und-Drang school to their culminating point; but his own later and very numerous works became in time more and more free from its blemishes, and rose to an almost Olympic calm, as Hellenic strength, and grace, and proportion. In Goethe's middle period he was intimately associated with Schiller (1759-1805), whose early works, The Robbers, Ficsco, and Don Carlos, threw the whole German people into a frenzy of excitement. Schiller's later dramatic works, if less exciting than these, gave evidence of more matined taste, while some of his ballads and lyrics may be German poets for drawing together into schools was again exemplified in the case of the Gittinger Dichterbund, formed at Göttingen about 1770. Its leading spirit was Voss, better known for his idyllic Luise. With him were associated more or less closely Bürger (author of Lenore), Hölty, the two Counts Stolberg, and Claudius. They took Klopstock for their high-priest, and sang of friendship, love of country, and all high and noble ideals. Among the works of prose fiction which appeared soon after this period are the novelettes of Zschokke, the romantic tales of Vulpius, the artistic romances of Hippel and J. G. Müller. Iffland attained great reputation as a writer of sensational dramas, and Kotzebue comedies.

The Romantic school, which succeeded the Sturm-und-Drang period, found for a while its inspiration in the medieval romances and in Shakospeare, admirably translated by Schlegel and Ticck. Its chief representatives and defenders were A. W. Schlegel, Friedrich von Hardenberg, better known as Novalis (1772-1801), Ticck, Fr. Schlegel, Schelling, and Wilhelm von Humboldt. Kleist is the chief dramatist of the school. Annong the writers who were smitten with the same tendencies are the poet Hölderlin, and De la Motte Fouqué, E. T. W. Hoffmann, and Chamisso, who loved to dwell on the mysterious agencies of nature, which they attempted to individualise and bring into association with material forms, as in the Undline of the first, the fantastic tales of the second, and the Peter Schlemihl of the third. Jean Paul Richter, the satirist and humorist, though sometimes included in the Romantic school, in reality occupies a position apart from and far above his compeers; and few novelists ever exerted so lasting an influence on the literature and mode of feeling of their compatriots as that which Richter exercised over the minds of the middle classes of Gormany during the close of the last and the early part of the present century. Poetry has also found noble representatives in the so-called Vaterlandsdichter (Poets of the Fatherland), among whom we may

instance Theodor Korner and Arndt, whose spirited patriotic songs are intimately associated with the war of 1813 against Napoleon, in which the former fell fighting gloriously. Rückert and Uhland belong to the same school; but the former is more especially known for his admirable adaptations and translations from oriental languages, and the latter

for his exquisite romances and hallads.

The public taste in fiction still encouraged the production of sentimental tales, in a sickly style, of which Clauren may be mentioned as an example, chiefly on account of the ridicule directed against him by the novelist Hauff, the champion of a healthier taste. Spindler, Willadd Alexis (W. Haring), whose Walladmor and other books are imitations of Walter Scott, and Caroline Pichler also belonged to a sounder and more artistic school. Raupach occupied the stage with his historical tragedies and his comedies, rivalled in south Germany by Baron von Antfenberg, and on the Rhine by Immermann, known also as the author of the romance Munchhausen. Adolf Millner and Grillparzer are also important names in the later history of the German drama.

The decade 1830 to 1840 is usually spoken of in German literary histories as the period of 'Young Germany,' a period of gifted but somewhat immature striving for independence and free self-development. Count Platen in his odes, sonnets, comclies, &c. represents the transition to this cra, of which Karl Gutzkow, Börne, and Lanbe may be taken as characteristic representatives. But the greatest name of this time is that of Heinrich Heine, who ranks with Gaethe and Schiller for lyrical power, and at the same time is master of an almost inatchless prose style. Menzel signalised himself by his attacks upon Goethe, Heine, and Gutzkow. Anerhach may be regarded as the creater of the Dorfgeschichte or village story, in which he has been followed by Maximilian Schmidt and Anzengruber. The sombre and sentimental Leuau (Niembsch von Strehlenau) is perhaps the chief name of the later Austrian school, which includes Count Anersperg (Anastasius Grün), Karl Beck, Moritz Hartmann of Bohemia, and A. Meissner. Emanuel Geibel, even yet one of the most popular lyric poets in Germany, was the head of the hand of poets who assembled round King Maximilian of Bayaria, among whom also were Dingelstedt, Bodenstedt (whose exquisite poems in the oriental style were published under the nom de querre of Mirza Schaffy), and Paul Heyse. Gott-schall wrote epic poems as well as dramas. Hebbel and Grabbe were both dramatists of vigorous but and Granne were non dramatists of vigorous but ill-disciplined power. Prutz, Hoffmann von Fal-lersleben, Schulze, Herwegh, Hebel, Freiligrath, (peculiarly skilful as a translator of English, Scottish, and French poetry), Schefer, Schack, Hamerling, and Leander (Volkmann) may also be mentioned among recent writers; Freili-grath and Hamerling have done better than average Jordan (Die Nibelungen), Kinkel, Redwitz (Amuranth), Otto Raquette (Waldmeister's Brautfahrt), Scherenberg, Böttger, and Victor von Scheffel (Tranpeter von Sakkingen). Many of these are (Trompeter von Sakkingen). Many of these are also dramatists; others are Halm (Baron Münch-Bellinghansen), Moser (a 'second Kotzelme'), Freytag, Ernst von Wildenbruch, Fitger, and Anzengruber. Paul Lindau has made a success as a writer of neat comedies; and in even slighter work Pacadia. This few Blanches are well known. work Benedix, Töpffer, Blum, &c. are well-known names. Fiction in Germany, as with ourselves, has been developed to an enormous extent in the present century, and no more than a few of the most prominent names can be here mentioned. Ida von Halm-Halm, Fanny Lewald, Johanna Schopenhaner, Von Hillern, and E. Marlitt are among

the best known of the lady-novelists, who have recently been joined by 'Ossip Schubin' (A. Kirschner). Gustav Freytag, one of the oldest, is still the most eminent of living novelists. Spiellagen, Hacklander, Gottschall, Gerstäcker, Paul Heyse, Charles Sealsfield, Ebers, Dalm, Scheffel, Lindau, Gottfried Keller (a Swiss), Oskar Meding (Samarow), Franzos, and George Taylor (Hausrath) have all in turn enjoyed wide popularity, to which some of them are still adding. Low German has been elevated to the dignity of a literary tongue by Fritz Renter, one of the greatest, if not the greatest, of Gernau lumorists, and by Klans Groth.
But numerous as have been writers of poetic

and dramatic literature during the present century in Germany, the tendency of the German mind has of late years been rather to science than The immense impetus given to the taste fiction. for scientille inquiry by A. v. Humboldt's Travels, and by his Cosmos and Views of Nature, has been followed by the appearance of a multitude of records of travel, among the more important of which we can only instance those of Martins in Brazil, Pöppig in South America, Tschudi in Peru, Lepsins and Brugsch in Egypt, Schomburgk in British Guiana, Gützlaff in China, Siebold in Japan, the hrothers Schlagiutweit in the Alps and m central Asia, Barth, Vogel, Rohlfs, and Schweinfurth in Africa, and Leichhardt in

Australia.

In conclusion we can only group together the names of a few of the many eminent Germans who by their labours and researches in physical and natural science have at once enriched the knowledge of the world and enhanced the literary and scientific glory of their own country. Without again referring to writers who have been already mentioned, we may specially instance, in astronomy and mathematics, Bessel, Encke, Strave, already mentioned, we may specially instance, in astronomy and mathematics, Bessel, Encke, Struve, Ganss, and Müdler; in the natural sciences and in medicine, Johannes Müller, Ehrenberg, Carns, Oken, Schleiden, Von Buch, Liebig, Kopp, Simon, Dove, Virchow, Moleschott, Bischoff, Rose, Vogt, Werner, Poggendorf, Erdmann, Gmelin, Grüfe, Vogel, Rokitansky, Wagner, Schönbein, Helmholtz, Hacckel, Mitscherlich, W. Weber, Kirchhoff, Nenmann, Du Bois Reymond, Halmemann, Hufeland, Von Baer, and Dieffeubach; in history, archaeology, and biography, Leo, Dnneker, Curtius, Giesebrecht, Sybel, Treitschke, Becker, Boeckh, Preller, Creuzer, Jacobs, Wachler, Kumo Fischer, Prenss, Böttiger, Varnhagen v. Ense, Pertz, Lappenherg, Pauli, &c, in geography, ethnology, statistics, politics, &c., Berghans, Ritter, Petermann, Stein, Hilbner, Klüden, Kohl, Bunsen, Bastian, Ideler, Zachariä, Gentz, Gueist, Ruge, Roscher, Schäffle, Riehl, Lassen, Unger, Zimmermann, and Otto Poschel; in law and jurisprudence, Savigny, Thibaut, Eichhorn, Pütter, Waitz, Fenerbach, Grolmann, and Mittermaier; in the history of aesthetics and the fine arts, Fr. Vischer, Fenerbach, Cholmann, and Mittermaier; in the history of asthetics and the fine arts, Fr. Vischer,

Carriere, R. Ziumermann, Weisse, Schassler, Ed.
Miller, Waagen, Kirchmann, and Liibke.
The genins of her musicians has placed Germany
at the head of the musical world. Such names as Seb. Bach, Handel, Gluck, Mozart, Haydn, Becthoven, and P. E. Bach in the 18th century, and Schnhert, Spohr, Weber, Mendelssohn, Schnnam, Brahms, Liszt (though a Hungarian by hirth), and Wagner in the 19th, are known to all who take an interest in the art of sweet sounds. In connection with this subject the writings of Helmholtz, Köstlin, Ehrlich, Schmann, Wagner, and

Liszt should be noticed.

Detailed accounts of the lives and literary careers of the principal writers, such as Goethe, Heine, Herder, Renter, Richter, Schiller, &c., will be found under their several names. See also such articles as

ESTHETICS, BIOGRAPHY, DRAMA, MUSIC, PHILO-SOPHY, PLATT-DECTSCH, ROMANTICISM; and for the German printed character, BLACK LETTER.

Language.—The standard authority on German Lexicography is the great Deutsches Wörterbuch, begun in 1852 by the brothers Grimm, and still in progress, under the care of Moriz Heyne, Rudolf Hildebrand, Matthias Lexer, Karl Weigand, and E. Wilcker. Admirable books are the Dictionaries by D. Sanders (1860-65) and Kluge (1882), and the smaller books by Sanders (3d ed. 1883) and Weigand (4th ed. 1882), the latter the best of all the smaller dictionaries. Other successors of the Grimms were Hofmann von Fallersleben, Ohland, Selmeller, Graff, Massmann, W. Waekernagel, M. Haupt, R. v. Raumer, Fr. Pfeiffer, Holtzmann, Müllenhoff, Zarneke, Bartsch, Wernhold, Paul, and Sievers; as well as, in the wider sense, Bopp and Schleicher. A few special books that Language. -The standard authority on German Lexico-

Massmann, w. Wakernagel, M. Hault, R. V. Raumer, Fr. Pfeiffer, Holtzmann, Müllenhoff, Zarneke, Eartsch, Wernhold. Paul, and Sievers; as well as, in the wider sense, Bopp and Schleicher. A few special books that may merely be named are Lexer's Mittelhochdeutsches: Handwörterbuch (1869-78); Dieffenbach and Wülcker's Hoch. und Nichr-Deutsches Worterbuch der Mittleren und Nichr-Deutsches Worterbuch der Mittleren und Nichr-Deutsches Worterbuch der Mittleren und Nichr-Deutsches Worterbuch (2d ed. Halle, 1873-81); Grimm's Deutsche Grummatik, edited by W. Scherer (Berlin, 1869-78); H. Rieckert's Geschicht der Neuhochdeutschen Schriftspreache (1875); R. v. Raumer, Geschuchte der Germanischen Philologie (1870); Trömel, Die Litteratur der Deutschen Mundarten (hähögraphical, Halle, 1884); and Strong and Meyer's History of the German Language (1886).

Literature.—See W. Scherer's Geschichte der Deutschen Litteratur (Berlin, 1883), of which the Clarendon Pros at Oxford has published a translation (2 vols. 1886); Koberstein's Grundries der Ges. der Deut. Nationallitteratur (2dd ed. 2 vols. 1885); Stern's Lexicon der Deutschen Litteratur (1882); and works by Wackernagel, Kurz, Gervinus (German poetry), Goodcke (poetry), Roquette, Koenig (illustrated), and Gottschall; for literature of 18th contury, Hettner, Hillebrand, and Biedermann; for literature of 19th contury, Julian Schmidt. Taylor of Norwioh, Coleridge, De Quincey, Carlyle, and Lewes did much to spread the taste for Gernan literature in England. See also Metcalfe's History of German Literature (trans. 4 vols. 1810); Bayard Taylor's Studies in Ger. Lit. (1879); and Hallam's Lit. Hist of Ger. Lit. (1853, based on Vilmar); W. Menzel's History of German Literature (trans. 4 vols. 1810); Bayard Taylor's Studies in Ger. Lit. (1879); and Hallam's Lit. Hist of Europe in the Middle Ayes. Annong more recent books are Gostwick and Harrison's Outlines of Cerman Literature (2d ed. Lond. 1883); A. M. Sols's Critical Outline of Lit. of Germany (trans. Lond. 1884); and W. M. MacCallum

Germen, a disused botanical synonym for Ovary (q.v.)

Germersheim, a town of the Bavarian Palatinate, occupies a marshy site on the left bank of the Rhine, 8 miles SSW. of Spires. Founded in 1276, it fell into the hands of the French in 1644, 1674, and 1688; and in 1793 the Austrians here defeated the French. Pop. 6132.

Germinal, the 'budding' month (March-April) in the French revolutionary Calendar (q. v.).

Germination (Lat germinatio, 'spronting'), the beginning of growth in a seed, or of the developmental process by which it is converted into a new plant. See SEED; also, for cryptogamic plants, Ferns, Fungi, &c.

Germ Theory. See GERM.

Gérôme, Léon, French historical genre-painter, was born at Vesoul, 11th May 1824, and in 1841 entered the studio of Paul Delaroche at Paris, at the same time attending the School of the Fine Arts. He began to exhibit in 1847; in 1855, 1857, and 1864 he travelled in the East; and in 1868 he was appointed professor of Painting in the School of the Fine Arts. His first great picture, 'The Age of Augustus and the Birth of Christ,' was exhibited in 1855; and four years later his 'Roman Gladiators in the Amphitheatre' raised to the highest pitch his reputation as a colourist and painter of the human figure, a reputation which was still further enhanced by 'Phryne before her Judges' (1861).

In the same year he exhibited, among other pic-In the same year he exhibited, almong other pictures, 'Socrates searching for Alcihiades at the Honse of Aspasia,' 'The Two Augurs,' and a portrait of Rachel. 'Louis XIV. and Molière,' 'The Prisoner.' 'Cleopatra and Cæsar,' 'The Death of Cæsar,' 'The Plague at Museilles,' 'Death of St Jerome,' 'Lioness meeting a Jaguar,' 'Rex Tibicen' (1874), and 'L'Eminence Grise' (1874) are among the lest known of his subsequent works. See Mr. the best known of his subsequent works. See Mrs C. H. Stranahan, History of French Painting (1889).

Gerona (anc. Gerunda), capital of the Spanish province of the same name, is situated 65 miles by rail NE. of Barcelona. It contains a beautiful Gothic cathedral of the 14th and 15th centuries. The inhabitants carry on the manufacture of paper, cork-entting, spinning, and weaving. The paper, cork-entting, spinning, and weaving. The fortifications are now of little value. Pop. 15,015. The town was formerly a place of great strength, and has undergone several notable sieges, particularly in 1653, 1684, 1694, 1706, and 1800, on each occasion by the French.—The province of Gerona measures 2271 sq. m. in extent, and had in 1883 a pop. of 301,536.

Gerry, Elberder, American statesman, was born in Marblebead, Massachusetts, 17th July 1744, graduated at Harvard in 1765, and was elected to the Massachusetts Assembly in 1773. He was a member of the Continental Congress of 1776, and served on several important committees; and in 1789 the Republican party elected him to the first National Congress. He was one of the envoys sent in 1797 to establish diplomatic relations with France. His colleagues, Marshall and Pinckney, being Federalists, were ordered to quit France. ney, being Federalists, were ordered to quit France, but Gerry was permitted to remain; and he did remain, to the indignation of Americans, until his recall was ordered. Elected governor of Massaclimsetts in 1810. Gerry, who was a keen partisan, removed the holders of civil offices and replaced them with Republicans; and he unfairly rearranged the districts of the state so as to secure the advanthe districts of the state so as to secure the advantage to his own party—a manœuvre for which his opponents coined the word gerrymander. He was defeated in 1812, but his party rewarded his zeal hy electing him to the vice-presidency of the United States, in which office he died, 23d November 1814, at Washington. There is a Life by James T. Austin (2 vols. Boston, 1828-29),

Gers, a department in the south-west of France, separated by Landes from the Bay of Biscay, with an area of 2415 sq. m., a climate healthy and tem-perate, a soil only moderately productive, no mineral riches, searcely any trade, and an agricultural population, among whom education has not risen above a very low level. In 1861 there were 298,931 inhabitarts, but the number has since steadily decreased; in 1881 it had fallen to 281,532; in 1886 to 274,301. There are parallel lines of hills in the south, separated by fan-shaped valleys which expand as they extend towards the plains in the north. The Gers and other principal rivers are tributaries of the Garonne and Adour. One-half of the surface is devoted to agriculture, and nearly a sixth to vine-yards. Wine of very moderate quality is produced yands. While of very monerate quarty is produced in considerable quantity; great part of it is converted into Armagnac brandy, which, after Cognac, is esteemed the best. The department has five arrondissements, those of Auch, Condom, Lectoure, Lombez, and Mirande; the capital is Auch.

Gersau, a village in the Swiss canton of Schwyz, on the Lake of Lucerne, and near the foot of the Rigi. Pop. (1880) 1771. From 1390 till it was also hed by the French in the Helvetian Republic (1798) the village and its territory, 5 miles square, was an independent republic. In 1817 it became part of Schwyz. See Coolidge in the Engl. Histor. Review, July 1888.

Gerson. John, one of the most eminent scholars Gerson, in the diocese of Rheims, December 14, 1363, his proper name being Jean Charlier. He was educated in Paris, at the College of Navarre, under the celebrated Peter d'Ailly. Here he rose to the highest honours of the university, and ultimately to its chancellorship, having acquired by his extra-ordinary learning the title of Doctor Christianissi-mis. He was a clear and rational theologian, an enemy to scholastic subfleties, while his reason found rest from all its difficulties in a devont Christian mysticism. During the nuhappy contests which arose out of the rival claims of the two lines which arose out of the rival claims of the two mes of pontiffs in the time of the Western Schism, the university of Paris took a leading part in the negotiations for union; and Gerson was one of the most active supporters of the proposal of that university for putting an end to the schism by the resignation of both the contending parties. With this view he visited the other universities, in order to obtain their assent to the plan proposed by that of Paris. But, although he had the satisfaction of seeing this plan carried out in the Council of Pisa, it failed, as is well known, to secure the desired mion. In a trentise inscribed to his friend D'Ailly he renewed the proposal that the rival pontifis (now not two, but three since the election of John XXIII. at Pisa) should be required to resign; and in the new conneil held at Constance in 1414 he was again the most zealous advocate of the same expedient of resignation. But his own fortunes were narred by the animosity of the Duke of Burgundy and his adherents, to whom Gerson had become obnoxious, and from whom he had already suffered much persecution, on account of the boldness with which he had denounced the marder of the Dake of To escape their vengeance he was forced to remain in exile; and he retired from Constance, in the disguise of a pilgrim, to Rattenberg in the Tyrol, where he composed his celebrated work, De Consolutione Theologie, in imitation of that of Boëthius, De Consolutione Philosophia. It was only after the lapse of several years that he was enabled to return to France, and take up his resienabled to return to France, and take up his residence in a monastery at Lyons, of which his brother was the superior. He devoted himself in this retirement to works of piety, to study, and to the education of youth. The only fee he took from his pupils was a promise to repeat the prayer, 'Lord, have mercy on thy poor servant Gerson.' He died 12th July 1420, in his sixty-sixth year. His works have merey on thy poor servant Gerson.' He died 12th July 1420, in his sixty-sixth year. His works fill five volumes in folio (Antwerp, 1706). The famous treatise on the *Imitation of Christ* (q.v.) has been ascribed to him by some writers, but it is now hardly doubtful that the true author was Thomas à Kempis. The authority of Gerson is much relied on by the advocates of Galliean principles; but the Ultramontanes allege that the principles laid down by him as to the authority of the nope are only applicable to the exceptional case in which he wrote—viz. that of a disputed snecession, in which the claim of each of the rival popes, and therefore of the existing papacy itself, was doubt-ful. See the studies by Charles Schmidt (Stras-burg, 1839) and Schwab (Würzburg, 1858).

Gerstäcker, FRIEDRICH, a German novelist and writer of travels, was born at Hamburg, 10th May 1816. Antimated with an irrepressible impulse for travel, he in 1837 went to New York, and began a six years' tramp through the United States, part of the time working at various trades, part of the time working at various trades, part of the time leading an adventurous life as a lumter in the forests. In 1843 he returned to Germany, and published Streif- und Jagdzuge durch die Vereinigten Staaten (1844), Die Regulatoren in Arkansas (1815), Die Flusspiraten des Mississippi (1848), &c. Leaving home again in 1849, he travelled round the

world by way of America, Polynesia, and Australia, reaching Germany in 1852. Most of the years 1860–61 were spent in South America; in 1862 he accompanied Duke Ernest of Gotha to Egypt and Abyssinia; and in 1867–68 he undertook another long journey, visiting North America, Mexico, Ecnador, Venezuela, and the West Indies. Of this last he gave a description in New Reisen (1868). His best books include Tahti, Die Beiden Straftinge, Unter dem Equator, Gold, Inscluelt, and Um die IVell (1847–48). His Gesammelte Schriften appeared in 44 vols. in 1872–79. Gerstäcker died at Brunswick, 31st May 1872. His works, of which several have been translated into English since 1847, owe their popularity to their simple, homely style, and to the vigour and truth of the descriptions and characters.

Gervas (Stachytarpheta Jamaicensis), a small verbenaceons shrub of the West Indies and tropical America. It is regarded as of high medicinal value, and was used by the Indian sorcerers as its ally the vervain was in Europe. It has also been introduced into Europe as Brazilian tea, and also frequently employed as an adulterant of tea proper.

Gervase of Canterbury, a monk who wrote a painstaking and fairly trustworthy chronicle of the reigns of Stephen, Henry II., and Riebard I., and also a history of the archbishops of Canterbury down to Hubert Walter. These works are valuable especially as elucidating the contemporary relations between church and state, though Gervase seems to have been animated throughout by a persistent dislike to the House of Anjon. The former was edited by Bishop Stubbs for the Rolls series (2 vols. 1879-80).

Gervase of Theren, a historical writer, born probably at Tilbury in Essex about the middle of the 12th century, and often said, without any foundation, to have been a nephew of King Henry II. of England. He lectured on canon law at Bologna, and was, under the Emperor Otho IV., marshal of the kingdom of Arles, and lastly provost of the numery at Ebsdorf. He died about 1235. His chief work is his Otia Imperialia, composed about 1212 for the entertainment of his imperial patron; the first two books consisting of an abstract of geography and history, the third containing a collection of curious heliefs about the 'Veronica,' British sirens, the magnet, and the like. The non-historical portions of the work were edited by Felix Liebrecht (Hanover, 1856). The whole was printed admirably by Leibnitz in vol. i. of Scriptores Rerum Brunseicensium. Many other works have been attributed erroneously to Gervase of Tilbury. A Liber Facetiarum, or book of ancedotes, he tells us he prepared for Henry II. of England.

Gervinus, Georg Gottfreid, German historian, was born at Darmstadt, 20th May 1805. Though at first engaged in commerce, he contrived to pursue his studies privately, then at the universities of Giessen and Heidelberg. In 1836 he was appointed professor of History at Göttingen. Already he had begun to publish his Geschichte der poetischen Nationalliteratur der Deutschen (5 vols. Leip. 1835-42), which, under the new title of Geschichte der Deutschen Dichtung, reached a fifth edition under the earc of K. Bartsch, 1871-74. In 1837 he was one of the seven Göttingen professors who signed the famous protest against the abolition of the Hanoverian constitution, in consequence of which he lost his chair, and was ordered to leave the country within three days. He went first to Darmstadt, then to Heidelberg, thence to Rome, and was in 1844 appointed honorary professor in Heidelberg. From this period his career was that of an active political writer in behalf of constitutional liberty. In July 1847 be helped to establish

the Deutsche Zeitung in Heidelberg, and next year was elected a member of the National Assembly by a district of Prussian Saxony. After the failure of the national democratic party in Germany, Gervinus returned disheartened to his literary pursuits, one of the fruits of which was his great work on Shakespeare (4 vols. 1849-52; 2d ed. 1872; Eugtrans. new ed. 1875), which may be regarded as on the whole the most important German contribution to Shakespearian criticism. The analyses of the characters show insight, learning, and much ingenuity; but the critic strains the interpretation in order to bring Shakespeare into harmony with his theory of him as the absolute and perfect dramatist. The book has been called in Germany the 'bulwark of Shakespearomania.' A later work was the Geschichte des 19ten Jahrhunderts (8 vols. 1856-66). Gervinns died at Heidelberg, 18th March 1871. See Briefwichsel zwischen J. und W. Grimm, Dahlmann, und Gervinus (ed. by Ippel, 1885).

Geryon, a fabulous three-headed being, possessing herds of splendid oxen, and said to be the son of a king of Hesperia. He figures in the story of Hercules.

Gesangbuch. See HYMNOLOGY.

Gesenius, Friedrich Heinrich Wilhelm, one of the greatest of German orientalists and biblical scholars, was born at Nordhansen, 3d February 1786, studied at Helmstedt and Göttingen, and at Halle in 1810 became extraordinary, in 1811 ordinary, professor of Theology. Here he lectured for more than thirty years, broken only by the closing of the university during the war of liberatural life. closing of the university during the war of liberation (1813-14), and by lengthened visits to France and England in 1820, to England and Holland in 1835. Among his pupils were Von Bohlen, Hoffmann, Hupfeld, Rödiger, Tuch, Vatke, and Benfey. He died October 23, 1842. His first great work was his Hebraisches u. Chaldaisches Handwörterbuch (1810-12; 10th ed. revised by Mühlau and Volck, 1886; Eng. trans, by Tregelles, 1846-52). His Hebr. Elementarbuch, consisting of the Hebraische Grammatik (1813; 24th ed. by Kautzsch, 1885) and the Hebraisches Lesebuch (1814; 11th ed. by Heiligstedt, 1873), has contributed enormously to the know. 1873), has contributed enormously to the know-ledge of the Hebrew language, not only in Germany, lust through translations also in England and America. Later works are his Kritische Gesch. d. Hebr. Sprache u. Schrift (1815), De Pentateuchi Samaritani Origine, Indote, et Auctoritate (1815), Grammatisch-kritisches Lehrgebäude d. Hebr. Sprache (1817), and a new translation of and commentary on Isaiah (1820-21). His greatest work is the monumental Thesaurus philologico-criticus Lingue Hebraica et Chaldaica Veteris Testamenti, of which the first part was published in 1829, but which was completed only in 1838 by Professor Rödiger. Many of the results of the rationalising method of interpreting the Old Testament, which characterises all the works of Geschins, have been unable to stand the test of progressive modern biblical science. He has certainly been surpassed by Ewald in insight into the genius of the Hebrew language, and its bearing on the interpretation of Hebrew life and thought, as well as in all that qualifies the critic for a true historical, asthetical, and religious appreciation of the literature preserved to us in the Old Testament. Yet his intense devotion to his favourile studies, and the advance which he made beyond all his predecessors in the establishment of more certain principles of Hebrew philology, undoubtedly entitle him to be regarded as having constituted a new epoch in the scientific study of the Old Testament. A fine sketch of his life was published at Berlin in 1843.

Gesner, Konrad von, a Swiss naturalist, sometimes called the German Pliny, was born at Zurich.

All his life long he was passion-26th March 1516. ately devoted to the pursuit of knowledge, especi-His early ally knowledge of the natural sciences. studies, in medicine, natural history, and Greek and Latin literature, were prosecuted at Zurich, and Latin interature, were prosecuted at Zurich, Strasburg, Bourges, and Paris. Returning home in 1535, he carned his living by teaching, until in 1537 he was appointed professor of Greek at Lansanne. This chair, however, he exchanged four years later for that of Physics and Natural History at Zurich, where he taught and practised as a physician until his death, on 13th December 1565. He was also an indefatigable writer of 1565. He was also an indefatigable writer of books, and in the course of his life published no less than seventy-two works, besides leaving at his death cighteen others in progress. His Bibliothera Universatis (1545) contained the titles of all the books then known in Hebrew, Greek, and Latin, unpublished as well as published, with criticisms and summaries of each; its second part, Pan-dectarum sire Partitionum Universalium Libri activation site transform Universation Lori XXI., came out in 1548-49. His next under-taking, by far the greatest of his literary works, was the Historia Animalium (1551-58). The first book treats of viviparous quadrupeds, the second of oviparous animals (tortoises, lizards, &c.), the third of birds, and the fourth of fishes and aquatic animals. Two other hooks pages accordingly were third of firds, and the fourth of fishes and adjusted animals. Two other books, never completed, were to have contained the history of serpents and insects. In this work, which will ever remain a monument of his untiring industry, he aimed at bringing together all that was known in his time concerning every animal. But hotany was probably the section of natural history with which he had the greatest profited acquaintage. He had had the greatest practical acquaintance. Ho had collected more than live hundred plants undescribed by the ancients, and was arranging the results of his labours in this department for a third magnum opus at the time of his death. appears to have been the first who made the great step towards a scientific classification of dis-tinguishing genera by the fractification. He also wrote on other branches of science, as medicine and mineralogy, and composed a great number of works dealing with the aucient classics, the Mithri-dates sire de Differentia Linguarum (1555) being the most notable. See Hanhart's Konrad Gesner (Winterthur, 1824).

Gesneraceæ, a sub-order of Scrophulariaceæ, including about 700 species, mostly herbs, chiefly of tropical America. They are frequently noted for the heanty of their flowers, notably Gloxinia, Achimenes, and other common inmates of our greenhouses. Fieldia africana, however, yields the so-called African Teak. Of the closely allied (rescentiaceæ, the Calabash Tree (q.v.) is of most importance.

Gessler, the name given to the tyrannical governor in the story of William Tell (q.v.).

Gessner, Salomon, a German pastoral poet, who also painted and engraved landscapes, was born at Zurich, 1st April 1730. His life was spent as a bookseller in his native town, where he died, 2d March 1788. In 1754 he published Daphnis, a conventional bucolic, sentimental, sweetly insipid, lifeless, and unreal. This was followed two years later by a volume of Idyls and by Inkel and Yariko. His Tod Abels (the Death of Abel), a species of idyllie heroic prose poem, which was published in 1758, although the feeblest of his works, had the greatest success, and helped to make its author's name known throughout Europe. Gessner's landscape-paintings are all in the conventional classic style. But his engravings are of real merit; some of them are said to be worthy of the first masters. In 1772 he published a second volume of Idyls, and a series of letters on landscape-painting.

Romanorum ('the deeds of the Romans'), the title of a collection of short stories and legends, in the Latin tongue, widely spread during the middle ages, but of the authorship of which little is known save that it took its present form most likely in England about the end of the 13th or the beginning of the 14th century. The stories are invariably moralised, and indeed the edifying purpose throughout is the sole unifying element of the collection. The title is only so far descriptive as the nucleus of the collection consists of stories from Roman history, or rather pieces from Roman writers, not necessarily of any greater historical value than that of Androcles and the lion from Aulus Gellins. Moralised mystical and religious tales, as well as other pieces, many of ultimate oriental origin, were afterwards added, and upon them edifying conclusions hung but awkwardly, bringing the whole up to about 180 chapters. Oesterley supposes its origin to have been English: the claims to its authorship of the Benedictine prior at Paris, Petrus Berchorius (died 1362), or of a certain Helinandus, may safely be set aside. style and narrative faculty displayed deserve but little commendation, but the book has a unique little commendation, but the book has a unique interest as at least the immediate source of many stories that have filled a large place in literature. It is enough to mention the stories 'Of Fenninine Subtlety' (120), retold in verse by Hoccleve; 'Of the Coming of the Devil, and of the Secret Judgments of God' (80), the story of Parnell's Hermit; 'Of Women who not only betray secrets, but lie fearfully' (125), the story of the sixty black crows, the foundation of Dr Byrom's clever poem, The Three Black Crows; 'Of too much Pride, and how the Proud are frequently compelled to endure some notable lumiliation' (59), a story of the Emperor the Prond are frequently compelled to endure some notable humilation' (59), a story of the Emperor Jovinian, the same as that of King Robert of Sicily as versified by Longfellow; 'Of the Transgressions and Wounds of the Soul' (102), the same as 'The Leech of Folkstone' in the Ingoldsby Legends; 'Of Mental Constancy' (172), a version of the romance of Guy of Warwick; and 'Of Ingratitude' (25), and 'Of Constancy' (66), together supplying the groundwork of Rossetti's poem, The Staff and Scrip. Here also may be found what are substantially the same stories as Chancer's Man of Lawes Tule, and Shakespeare's King Lear and Merchant of Venice.
One tale, 'Of the Game of Schae' (166), is a somewhat obscure description of the game of chess. The longest story, 'Of Temporal Tribulasomewhat obscure description of the game of chess. The longest story, 'Of Temporal Tribulation' (153), is that of the adventures of Apollonius of Tyre, his wife and daughter, as in Gower's Confessio Amantis, and in Pericles. Gower, however, took it from the Pantheon (end of the 13th century) of Godfrey of Viterbo. Enough has been said to show that great part of the stories. has been said to show that great part of the stories belong alike in form and substance to the ancient story stock of Europe, and hence the book must be studied side by side with the romance of Barlaam and Josaphat, the Disciplina Clericalis of Petrus Alphonsus, the Otia Imperialia of Gervase of Tilbury, Yoragine's Golden Legend, the Speculum Historiale of Vincent of Beauvais, and the medieval fables connected with the name of Æsop, no less than with such works of literary elaboration as the Arabian Nights, the Talmud, the Fabliaux, the Decameron, and the Canterbury Tales.

The stories in the Gestu Romanorum are mostly bald and inartistic, seldom if ever relieved by a touch of pathos or a gleam of humour, and never by any chance reaching the region of the really dramatic; yet they have a rare literary charm of their own in their atternativeté and artlessness, as well as in the beautiful simplicity of their moralisations, based on a piety that questions nothing or finds relief in an unfathomed inysticism. Some of the best stories are those that gird at the weaknesses

or faults of women—a direction in which monkish wit was ever prone to turn.

The modern form of the Gesta Romanorum is, as has been said, a collection of 181 stories, first printed about 1473, but no MS. corresponding exactly to which now exists. The first printed edition was issued at Utrecht in 150 chapters; the second, forming the standard text, within 181 chapters, at Cologne. Although both of these are undated, Oesterley proves that their publication falls between 1472 and 1475. An edition in English was printed by Wynkyn dc Worde (1510-15), from MSS. differing widely from those reproduced in the early printed Latin versions. Oesterley divides the numerous MSS into three groups or families: (1) the English group, written in Latin, the best representative of which has 102 chapters, of which 72 are found in the standard text; (2) the group of German and Latin MSS., represented by an edition printed in German at Augsburg in 1489; and (3) a group of MSS, represented by the standard text, influenced by distinct collections of stories, as Robert Holkot's Moralisationes Pulchra in Usum Predicatorum and the like. The striking diversity between the MSS, in England and the printed collections led Douce to believe that there were two distinct collections of stories, one of German, the other of English origin. Oestcrley's conclusion is that this Gesta was originally compiled in England, that it passed quickly to the Continent, was there altered considerably before being printed, and that both the two first printed editions were compiled from several MSS. The second (the standard) form was the largest, and, reaching England band before more of the second. land before any of the native MSS. had been printed, became accepted as the standard form for the printed text, spite of its many divergences from the MSS, that still existed.

from the MSS, that still existed.

An English version by the Rev. C. Swan was printed in two volumes in 1824; in a revised form, by Wynnard Hooper, in Boln's 'Antiquarian Library,' in 1877. Sir F. Madden edited The Eurly English Versions of the Gesta Romanorum for the Roxburghe Club in 1838, Mr Sidney J. H. Herrtage for the Early English Text Society in 1879. Critical editions of the Latin text have been edited by A. Keller (Stuttgart, 1842), and H. Oesterley (Berlin, 1872), the last with a masterly introduction. See also the Dissertation in Warton's History of English Poetry, and in vol. ii. of Donce's Illustrations of Shakespeare; but these must not now be followed implicitly.

Gestation, the retention of the mammalian embryo in the nterns. The period of gestation—i.e. between the fertilisation of the ovum and the extrusion of the fœtus—varies greatly, from about 18 days in the opossum and 30 in the rabbit to about 280 in man and 600 in the elephant. Robert Chambers in his Vestiges of Creation emphasised the importance of prolonged gestation as a factor of evolution, and it is certain that the more highly evolved mammals have longer periods of pregnancy than the lower. The size of the animal, the number of offspring at a birth, and the degree of their maturity at birth have also to be considered: thus, the gestations of cow and sheep last about 280 and 150 days respectively, those of mare and bitch about 350 and 60 days, those of giraffe and kangaroo about 420 and 40 days respectively. In the Marsupials, where the placental union between mother and offspring is still undeveloped, the birth is almost always very preceeious, but in most cases the young are stowed away after birth in the external pouch. The lowest mammals—duckmole and Echidna—are oviparons. See Fettus, Mammalia, Placenta, Pregnancy, Reproduction.

Getæ, a people of Thracian extraction, who are first mentioned in history as dwelling on the right bank of the Danube, but who in the middle of the 4th century B.C. crossed that river and settled in

Transylvania and Wallachia. They were conquered by Darius Hystaspes in 515 B C., and then accompanied him in his campaign against the Scythians. Both Alexander the Great, in 335, and Lysimachos, in 292, made attempts to subdue them, but neither was successful. During the first half of the 1st century B.C. they became politically united with the Dacians, a cognate race who had settled in their territories. The Getæ, as distinct from the Dacians, sided with Octavins against Antony, and during the greater part of the 1st century after Christ continued to harass the Roman legions. In 106 B.C. their country being added to the empire. Subsequently the Getæ became fused with the Goths (q.v.), who invaded their lands, and afterwards carried many of them with them in their westward migrations.

Gethsemane (Heb. yath, 'a wine-press,' and shemen, 'oil'), the scene of our Saxioni's agony on the night before his Passion, was a small farm or estate at the foot of Monnt Olivet, somewhere on the east slope of the Kedron valley, and rather more than half a mile from the city of Jerusalem. Attached to it was a garden or orchard, a favourite resort of Christ and his disciples. The place is not now exactly known, but an enclosure with a few old olive-trees is pointed out to travellers as the site of the garden.

Gettysburg, capital of Adams county, Pennsylvania, built on several hills, 50 miles by mil SSW. of Harrisburg. It contains a Lutheran college (1832) and seminary (1820). Pop. 2814. Gettysburg was the scene of one of the great battles of the civil war, on 2d and 3d July 1863, when General Meade gained a hard-fought victory over the Confederate General Lee. Near the town there are numerous monuments commemorating incidents of the battle; and in the national cemetery is a national monument of granite, 60 feet high.

Genlinex, or Geulinex, Arnold, a Dutch philosopher, one of the disciples of Descartes (q.v.), and a leading exponent of the speculative doctrine known as Occasionalism. Very little that is authentic is known about his life. He was born at Autwerp in 1625; for twelve years, from 1646, he lectured successfully at Louvain, was then deposed for some reason not ascertained, and, after living at Leyden in great distress, was in 1665 appointed professor of Philosophy there, but died four years later. His ideas are expounded in books entitled Saturnalia, Logica, Ethica, published in his lifetime, and in Annotata practurentia ad Cartesii Principia (1690) and Metaphysica Fera (1691), which appeared after his death. The salient point of his teaching is an endeavour to explain the relatious which obtain between soul and body, the mutual interaction of which under stimulus he ascribed to divine intervention and preordained arrangement. See works by Grimm (Jena, 1875), Pfleiderer (Tub. 1882), and Samtleben (Halle, 1886).

Geum, a genus of Rosacer, sub-order Potentilleæ, distinguished from Potentilla by the hardened hooked styles which crown the carpels, so that the fruit becomes a bur. Two species are common natives of Britain, G. urbanum, the Wood Avens or Herb Bennet, and G. rivale, Water Avens, the former with erect yellow flowers, and the latter with nodding flowers of a brownish hue. The former grows in hedges and thickets, the latter in wet meadows and woods, and sometimes even in very alpine situations. The so-called G. intermedium is usually regarded as a mere hybrid of these two species. Both are aromatic, tonic, and astringent, and of old repute among herbalists; the rootstock of the former was formerly gathered in early spring to impart its clove-like flavour to ale, and is still

used in the preparation of liqueurs. G. canadense,

the Chocolate Root or Blood Root of North America, has some reputation as a mild tonic.

Geyser, or Geysik (Icelandic geysa, 'to binst ont violently'), is the name applied to emptive fountains of steam and hot water met with in various quarters of the globe, espe-cially in Iceland, North America, Zealand, New Tibet. and the The water Azores. of these springs is clear often and limpid, but fiequently thick, tur-



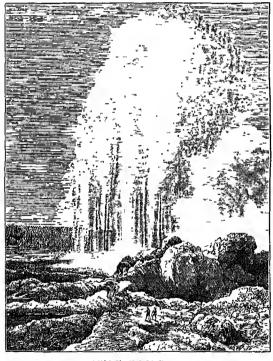
Water Avens (Geum rivale).

bid, and heavily charged with mud; examples of the latter have been discovered in Burma. The mineral substances held in solution in geysers are mmerous and varied in character, including sodium chloride, calcium sulphate, sodium sulphate, calcium carbonate, magnesium carbonate, ammonium carbonate, potassium chloride, silica, various silicates, sulphur, fenic oxide, aluminium oxide, carbonia acid, &c. Some of these substances, becoming separated from the water by evaporation, form bashr-shaped cones of solid matter, from the midst of which the geyser rises, and in course of time assume proportions of considerable magnitude; the cones are principally of a calcareous or siliceous character, the latter, known as siliceous sinter or geyserite, being apparently most common. It is either a compact, dull, sometimes, but less frequently, transluccut laminated substance, or shapeless, porous mass, occasionally impregnated with ferrie oxide, which produces a red or pink tinge.

Gensers occur only in regions where volcanic activity has but lately become dormant, but is not yet altogether extinct, and the phenomena connected with them are connected with seismic action. Bunsen and Descloizeaux have formulated a theory explaining the phenomena, which has met with wide acceptance and is generally preferred to the views held by such authorities as Bischof, Mackenzic, Herschel, Von Nidda, and others. Shortly stated, the explanation put forward by the two former is as follows, founding upon observations made at the Great Geyser of Iceland. In the tube of this geyser, and near the surface, the water temperature is 212° F., increasing downwards until a degree of heat is reached very far above the boiling-point of water under ordinary atmospheric pressure, fluidity being maintained by the weight of the column of water above. The water in the tube or funnel of the geyser communicates with an area directly acted upon by the source of the subterranean heat, such communication being attained by means of a lateral chamber or passage. Far down in the funnel steam is generated, which, nising immediately into the cooler water above, is condensed, heating the upper water until the boiling-point is reached, and relieving the pressure upon the lower portions of the greatly heated water, which flashes into steam. This alteration passing down the funnel results in closely following explosions of steam, shooting the whole contents high into the air, and producing the well-known outward manifestations associated with geysers.

These manifestations are most frequently met with where large masses and thicknesses of rock have undergone extensive crushing, fracture, and compression—which may account not only for the subterranean heat, but also for the presence of the underground passages apparently necessary for the production of a general.

The geysers of the Yellowstone region are probably the most picturesque and wonderful in the world: on the Firehole River alone, within an area of 30 sq. m., there are probably 50 geysers, throwing columns of water to a height of from 50 to 200 feet, while smaller jets rise occasionally to 250 feet. The 'Old Faithful' geyser, in this region, throws up a column of water 6 feet in diameter to a height of 100 to 150 feet, at intervals of about an hom. Near the north entrance to the National Park, also, are the hot springs of the Gaidiner River; here the 'White Monntain,' built up of terraces of white calcarcous deposits, rises to a considerable height, with a diameter of 150 yards at the top. The terraces are of varying width, measuring from a few inches to many feet, and are separated one



'Old Faithful' Geyser.

from another by small cliffs of from 6 inches to 10 or 12 feet in height. From the top of the mound water is continually trickling down over these rocks and terraces, the precipitate left behind ever slowly adding to the bulk of the cone. As the streams fall from terrace to terrace they are received into several natural basins, and, as the water gradually cools as it nears the bottom, bathers me enabled to choose almost any temperature of water, and these natural baths are largely taken advantage of. See Yellowstone.

The geysers of Iceland are situated within sight of Mount Hekla, 16 miles north of Skalhalt, and are the hottest springs in Europe, as well as the best known in the world. Norwegian writers of the 12th century noted their presence, but it was nearly 600 years later before parties outlors.

described or noticed them in any way. The principal geysers of this region are known as the 'Great Geyser' or 'Roarcr,' and the 'Stroker' or 'Chinn,' The former consists of the usual mound of siliccous incrustations, almost cucular and about 40 feet in height, the top forming a basin measuring 52 feet by 60 teet, fined with a pure white siliceous coating of considerable handness. A tube, 74 feet in length, communicates with the interior of the geyser, the upper opening being in the centre of the basin. There can be no doubt that the geyser has itself built up the tube and mound—a work, according to careful calculations and experiments undertaken on the spot in 1859 by Commander Forbes, which must have occupied over cleven centuries. Probably the best account of this geyser is that of Henderson, who visited the district in 1814. The 'Churn' has an irregular opening, not more than eight feet wide, the tube decreasing in width as it descends, permitting one to look down upon the boiling water 20 feet below without much danger to the observer. If the orifice be temporarily choked by throwing in tuff the water will soon burst through, rising 60

feet into the air, carrying the obstruction along with it, and diffusing dense clouds of steam in

all directions

The general of New Zealand attained celebrity principally on account of the beautiful tenaces associated with them, and have often been described and figured. Unfortunately, volcanic activity manifested itself throughout the region in June 1856, resulting in much loss of life and property, and in the destruction of the tenaces. The basins connected with these general, catching the overflow of water, are, like those of the Yellowstone region, largely used by bathers, and are much resorted to by invalids. Fronde and Martin may be consulted for descriptions of typical New Zealand geysers. See MINERAL SPRINGS.

Gfrörer, August Friedrich, a German historian, was horn at Calw, in the Black Forest, 5th March 1803. He studied theology at Thibingen, next lived at Lansanne, Geneva, and Rome, becoming on his return in 1828 a Repetent at Thibingen, and in 1830 librarian at Stuttgart. He now gave himself with much real to historical studies, of which the first finit was his Philo and die Judisch-Alcandrinsche Theosophie (1831), followed by Gustav Adolf (1835), a work which aimed at bringing into prominence the political rather than the religious rôle of the great Swedish king. His Geschichte des Urchristenthums (1838) was called forth by the greater work of Strams. In his Allgemeine Kirchengeschichte (1841-46), coming down to 1305, he first spoke out his admiration for the polity of the Roman Church. Soon after he was called to the chair of History at

Freiburg, and in 1848 he was sent to the Frankfort paliament, where he was one of the most decided adherents of the party called the Grassdeutschen, the fanatical opponents of Plussia. He formally went over to Rome in 1853, and thereafter was distinguished by his large share of the intolerance of the convert, although all the while he was never a dogmatically satisfactory Catholic. He died at Carlsbad, July 6, 1861. His most important other works were Geschichte der Kurolinger (1848) and Papst Gregorius VII. (1859-61). All his works are learned, often pervensely so; his conclusions are too often more ingenious than sound.

Ghadames. See GADAMES.

of the 12th century noted their presence, but it Ghara is the name sometimes given to the was nearly 600 years later before native authors united stream formed by the junction of the Sutlej

and the Beas, from Endrisa to the junction with the Chenab, when it becomes known as the Panjaad. The distance between the two points of confinence is about 300 miles.

Ghasel, or GHAZEL, a favourite form of lyrical poetry among the Turks and Persians, which may be either crotic and bacchanalian, or allegorical and mystical.

Ghats, or Ghauts (in English, 'gates, passes, or landing-stairs'), Eastern and Western, two converging ranges of mountains, which run parallel with the east and west coasts of southern India, and meet at an angle near Cape Comorin. (1) The Eastern Ghats commence in the vicinity of Balasor, a little north of the Mahanadi, and run through Madras, with an average height of 1500 feet, for the most part at a distance of from 50 to 150 miles from the coast. They are nowhere a watershed on any considerable scale, being penetrated and crossed by nearly all the drainage of the interior. (2) The Western Ghits stretch from the valley of the Tapiti, in about the same latitude as Balasor, to the construction with the kindral ridge, and on to their junction with the kindred ridge, and on to Cape Comorin itself. Though they are generally far more continuous and distinct than the Eastern Gháts, yet they are sharply divided by the gap of Palchat—the northern section measuring 300 miles in length, and the southern 200. Their general ni length, and the southern 200. Their general elevation varies from about 3000 feet to upwards of 7000; the peak of Dodabetta, in the Nilgiri hills, is 8760 feet above sea-level. The opposite faces of these mountains differ very remarkably from each other. Landward, there is a gradual chart of the December 2000. slope to the tableland of the Deccan; seaward, sinple to the taineanth of the Deccan; seaward, almost perpendicular precipices, speaking generally, sink at once nearly to the level of the sea, with only a comparatively narrow strip between them and the shore. This peculiarity, along with the heavy rainfall brought by the south-west monsoon, causes, more particularly towards the south, that singular feature of the country which is known as the 'backwaters' (see COCHIN). The Western Châts are a watershed, for not a single Western Glats are a watershed, for not a single stream of any magnitude finds its way through them. Their vast prineval forests display some of the most magnificent scenery in India, and supply abundance of the finest timber. In the south there is a railway from Beypur to Madras, finding a comparatively easy access to the interior by the Palghat valley. In the north, near Bombay, two railways scale the precipitons face of the Western Ghats. Of these the line up the tremendous ravine of the Bhor Ghat, 40 miles SE. of Bombay, is regarded as one of the greatest engineering feats ever accomplished in India. The railway rises by a lift of 15½ miles to a height of 1831 feet, twisting round the mountains on narrow ledges that are often half embankment, or that rest on high vaulted arches, and passing through tunnels that aggregate 2535 yards. Besides 8 viadnets there are 18 bridges and 58 culverts, and the average gradient is 1 in 48.

The name GHATS is also applied to the flights

The name GHATS is also applied to the flights of steps, whether intended as landing-places or as bathing-stairs, which line the river-banks in towns and places of pilgrimage in northern and central India. Most great rivers, and especially the Ganges, possess many ghats; but they are also built on the margins of lakes, as at Pushkar and Sagar, or even of tanks. The uniformity of the long lines of steps is often broken by shrines or temples, built either close to the water's edge or at the top; and on these steps are concentrated the pastimes of the idler, the duties of the devout, and much of the necessary intercourse of business. The ghats of Benares (q.v.), Hardwar, Panharpur, and of Maheswar, on the Nerbudda, are noteworthy

either for their number or heanty; while Cawnpore, Sadullapur, the rained city of Gaur, and other places possess noted 'burning ghits' for purposes of eremation. See also Fergusson's Handbook of Architecture.

Ghazali, Aby Mohammed Al., known in the West as Algazel, a Moslem theologian who, in the 11th century, struck a serious blow at the scholastic philosophy of the Arabians. Born at This in Khorasan in 1058, he studied in his natal city and at Nishaphr, being especially mirtured on the principles of Shism (q.v.). When thirty-three years old he was appointed by the grand-vizier of Bagdad to a chair of philosophy in the university of that city. But four years later he set off for Mecca; then spent ten years lecturing at Damascus; and finally went on to Jerusalem and Alexandria, where also he tanght with signal success. In the end, however, he returned to This, where he founded a Shife college and dedicated the remainder of his life, until 1111, the year of his death, to religious and philosophic contemplation. The most notable of his numerous works are Opinions of the Philosophers, this latter virtually an introduction to the more famous Destruction of the Philosophers, in which he challenges the methods and conclusions of the current scholasticism of Arabian philosophy. He also wrote a commentary on the ninety-nine names of God, several ethical treatises, and varions other works on religion and philosophy. Several of his works have never yet been published.

Ghaziabad, a town and important railway junction in Meernt district, North-west Provinces of India, 28 miles SW. of Meernt, with barracks, and a considerable trade in grain, hides, and leather. Pop. 12,059.

Ghazipur, a city of India, capital of a district of the same name in the North-west Provinces, stands on the left bank of the Ganges, 44 miles NE. of Benares. The city, which stretches along the Ganges for about 2 miles, contains the ruins of the Palace of Forty Pillars, and a marble statue by Flaxman to Lord Cornwallis, who died here in 1805. Ghazipur is the headquarters of the Government Opium Department for the North-west Provinces, all the opium from these provinces heing manufactured here, and there is some trade in sugar, tobacco, rose-water, and coarse long-cloth. Pop. (1881) 43,232.—The district, of which Ghazipur is the administrative headquarters, has an area of 1473 sq. m., and a pop. of (1881) 1,014,099.

Ghazni (also spelt Ghizni and Ghuzner), a fortified town of Afghanistan, stands below a spor of a range of hills, at an elevation of 7729 feet, 84 miles SW. of Kalml, on the road to Kandahar and at the head of the Gomal route to India. It is a place of considerable commercial importance. The climate is cold, snow often lying for three months in the year. Nevertheless, wheat, barley, and madder are grown in the vicinity. Its population is estimated at about 10,000. From the 10th to the 12th century Ghazni was the capital of the empire of the Ghaznevids (see below); it then fell into the hands of the sultan of Ghar, and enjoyed a second period of splendour. Having shortly afterwards been captured by the Mongols, it rapidly fell into decay. It remained, however, subject to the descendants of Baber, the Mongol rulers of Delhi and Agra, down to 1738, when it was taken by Nadir Shah of Persia, and at his death was incorporated in the kingdom of Afghanistan. During the 19th century it figured in the British wars against the Afghans, having been storned by Lord Keane in 1839, and again in 1842 by the Afghans, but retaken the same year by General Nutt. In the neighbourhood of Ghazni

there are several ruins and monuments of its former greatness, such as the tomb of Mahmud, Mahmud's dam in the Ghazni River, immerous Truin-heaps north-east of the town, and many Mohammedan shrines. The celebrated gates of Sonnath (q.v.) were kept at Ghazni from 1024 to

Ghaznevid Dynasty.—About the middle of the 10th century a lientenant of the Samanid ruler of Bokhara seized upon Ghazni, and, dying in 977, left it to his son-in-law, Sebuktagin, who during a reign of twenty years extended his sway over all modern Afghanistan and the Punjab. But it was under his son Mahmud (997-1030) that the Ghaznevids reached their highest point of splendour and renown. This prince repeatedly far as Kurdistan and the Caspian on the west and to Samarkand on the north. He was the first monarch in Asia to assume the title of sultan. His descendants had a keen struggle to maintain themselves against the Seljuks, who had seized upon Khorasan, Balkh, Kharezm, and Irak during the reign of Mahmud's son Masaud (1030-42), and against their jealous rivals the princes of Ghúr (q.v.). Bahram Shah, ruler of Ghazni from 1118 to 1152, was at length driven from his capital by the latter, and retired to the Punjab. There his grandson, Khosran Malek, the last of the dynasty, made Labore his capital. This town was, however, taken by the prince of Ghar in 1186, and with this the Ghaznevid dynasty came to an end.

Glice (Ghi), a kind of clarified butter used in many parts of India, and generally prepared from the milk of buffaloes. The fresh milk is boiled for an hour or more; it is then allowed to cool, and a little curdled milk, ealled dive, is added to promote coagulation. The curdled mass is clumed for half an hour; some hot water is then added, and the churning continued for another half-hour, when the lutter forms. When the butter begins to become rancid, which is usually the case after a few days, it is boiled till all the water contained in it is expelled, and a little dhye and salt, or hetel-leaf, is added; after which it is put into closed pots to be kept for use. It is used to an enormous extent by the natives of many parts of India, but is seldom relished by Europeans.

Gleci, a colony for the insanc, in Belgium, 26 miles ESE of Antwerp by rail. It is an oasis in a desert, a village and commune (20 miles in eircumference) in a comparatively fertile spot, inhabited and cultivated by 11,000 peasants, in the midst of an extensive sandy waste, called the Campine (see Belgium). Here in 600 A.B. St Dymphna, an Irish princess, is said to have been beheaded by her father, for resistance to his incestuous passion. Pilgrius, the sick, the sorrowful, and the insane, visited the shrine of the Christian rivers by the last wave restored to sent the sarrowith. virgin; the last were restored to sanity and serenity. About 1300 insane persons are lodged with the citizens of this community, and are controlled and employed by them, and this without recourse to walls or other asylum appliances, and with little coercion of any kind. The quieter sufferers reside generally one in each family in the village, the more excited in separate farmhouses at some distance on the confines of the commune, while those requiring medical treatment are temporarily accommodated in the infirmary in Gheel. The support of the patients is in most cases gnaranteed by the state. See works in French on Gheel and the Gheel writer. We have the content of the content o system' by Duval (1867) and Peeters (1879).

Ghent (Flem. and Ger. Gent, Fr. Gand), a city of Belgium, capital of the province of East Flanders, is situated at the confinence of the Lys and the Scheldt, 34 miles by rail NW. of Brussels.

It is divided by canals into 26 islands, connected by 270 bridges, and is encompassed with gardens and meadows, while the former walls have been converted into pleasant promenades. It is in general well built; but in the older part it still betting the support of the converted built; but in the older part it still the converted built; but in the older part it still the converted built; but in the older part it still the converted built in the converted built i retains several quaint and picturesque houses. Among the chief buildings are the cathedral of St Bavon, of the 13th and 14th centuries, counted amongst the finest churches of the country, and containing the 'Adoration of the Lamb,' by the brothers Van Eyck; the belfry tower (1183–1339), brothers Van Eyck; the belfry-tower (1183-1339), 280 feet high, or 375 with the iron spire of 1855; the new citadel (1822-30); the hôtel-de-ville (1480-1628), one of the most florid specimens of flamboyant Gothic in Belgium; the Palais de Justice (1835-43), with a peristyle of the Corinthian order; the university (1816), the Béguinage (q.v.), and the Academy of Painting. The cotton, woollen, and linen manufactures are the chief industries. Leather, lace, and smear are also manufactured. Leather, lace, and sugar are also manufactured, Leather, lace, and sngar are also manufactured, and there are foundries, machine-works, breweries, &c. Specially noteworthy is the floriculture of Ghent. By the Great Canal, which flows into the Scheldt, Ghent is united with the sea, and it can receive into its docks vessels drawing 17 feet of water. The harbour is capable of holding 400 vessels, new docks having been opened in 1881. Ghent is very rich in charitable and public institutions. With the university are united a school for tions. With the university are united a school for civil engineers, another for arts and sciences, and the former town-library. Pop. (1846) 102,977; (1888) 147,912.

Ghent, whose patron-saint, the soldier-monk Bavon, is said to have died in 655, was certainly Bavon, is said to have then in 605, was certainly a prosperous city in the time of the Merovingian Franks. In 1007 it was given by the emperor to Count Baldwin IV. In the 12th century it was made the capital of Flanders. And under the counts it continued to prosper and increase, until, in the 14th century, it was able to send 80,000 men into the field, and to with tool divide and the with tool divide and the the field, and to withstand, single-handed, the power of the count backed up by the king of France. The wealth of the citizens of Ghent, and the musual measure of liberty which they enjoyed, encouraged them to resist with arms any attempt to infringe upon their peculiar rights and privileges. This jealous and turbulent spirit is exemplified in the famous insurrection of Jacob van Artevelde (q.v.), and other instances. John of Gaunt, i.e. (thent, was born here in 1340. For many years the city maintained a vigorous resistance against the Dukes of Burgundy; and having rebelled against Charles V., their successor, in 1540 it was deprived of its privileges. From this time the town began to decay, and under Philip II. the Inquisition struck a yet deadlier blow at its well-being. In the various wars of which the Netherlands has been the battle-ground, Ghent has suffered severely, and has been frequently taken, especially in the 18th century. Falling into the hands of the French at the Revolution, it was made the capital of the department of the Scheldt, till its incorporation in the kingdom of the Netherlands in 1814, in which year was signed the peace of Ghent between Britain and America. In 1830 it fell to Belgium, See FLANDERS; also Van Duyse, Gand, monumental et pittoresque (Brussels, 1886).

Gherardesca. See Ugolino.

Glietto (Ital.), the Jews' quarter in Italian cinetto (Ital.), the Jews' quarter in Italian cities, to which they used to be strictly confined. The ghetto of Rome, instituted in 1556 by Pope Paul IV., was removed in 1885 and following years, its demolition having been rendered necessary by the new Tiber embankment. The term is also employed to indicate the Jews' quarters in any city. See Jews.

Ghi. See GHEE.

Ghibellines. See Guelphs.

Ghiberti, LORENZO, an Italian gold-mith, Gliberti, LORENZO, an Italian goldsmith, bronze-cas-ter, and sculptor, was born at Florence about 1378. He was apprenticed to his stepfather, a skilful goldsmith, and also acquired dexterity in drawing, painting, and modelling. In 1400 he executed a nable freesco in the palazzo of Pandolfo Malatesta at Rimini. Along with other artists, he was next chosen (1401) by the Florentine guild of merchants to compete for the execution of a gate in lyonge to watch that overstally a drive Pisano. in bronze, to match that executed by Andrea Pisano in the haptistery in 1336. The subject of the design was 'The Sacrifice of Isaac,' to be executed in bas-relief as a model for one of the panels. The judges selected Ghiberti's design, both on account of the art and beauty of its conception and the delicacy and skill of its execution. When Ghiberti had completed this great work (1424) his fellowcitizens entrusted him with the execution of another gate, to emulate the two already adoming the baptistery. This second gate, finished in 1452, conbaptistery. This second gate, finished in 1452, contains ten reliefs on a larger scale, the subjects in this case also being wholly biblical. The mingled grace and grandeur of these compositions is beyond all maise; though his treatment of bas-relief has been condemned as wrong in principle. On the two gates he spent fifty years of most patient labour. Not the least of (hiberti's merits was the success that attended his efforts to break down the conventionalism that before his day hampered the free development of sculptural art. Among his other works may be mentioned the sepulchral monuments of Dati in Santa Maria Novella, and of the Albizzi in Santa Croce at Florence, executed about Addizing a santa Croce at Prorence, executed anont 1427; a bronze relief in the Duomo, representing St Zenobins bringing a dead child to life (1440); and between 1414 and 1422 bronze statues of St John the Baptist, St Matthew, and St Stephen for the church of Or San Michele. Ghiberti died at Florence, 1st December 1455. See Perkins, (Milhard et ap. Ecola (Paris, 1885). (thiberti et son École (Paris, 1885).

Ghika, Helena, Princess Koltzoff-Massalsky, Ghika, Helena, Princess Rolfzott-Massalsky, hetter known by her literary pseudonym of Dora d'Istria, was a daughter of Prince Michael Ghika, was a niece of two hospodars of Wallachia, and was born at Bucharest, 22d January 1829. The family from which she was descended was Albanian in origin, and from the time of George Ghika, hospodar of Wallachia in 1660, gave many princes and eminent men to the principalities (see ROUMANIA). Profoundly instructed in the classics under the care of George Pappalopoulos, the princess added to her acquirements by travels through Germany, France, and Italy an extensive knowledge of modern languages and literature. At fifteen she commenced a translation of the *Riad* into German, and not long after wrote several pieces for the theatre. On her unhappy marriage in 1849 with Prince Koltzoff-Massalsky she accompanied her husband to the court of St Petersburg; but from 1855 she resided mainly at Florence, where she died, 1855 she resided mainly at Florence, where she died, 22d November 1888. Her first important work, La Vie Monastique dans l'Église Orientale, was published in 1855. Other works were: La Suisse Altrmande (1856); Les Femmes en Orient (1860); Excursions en Roumélie (1863); Aux Bords des Laes Helvétiques (1864); Des Femmes, par une Femme (1864); Gli Albanesi in Rumenia; Storia dei Principi Ghika (1873); La Poésie des Ottomans (1873). She wrote much for the Revue des Deux Mondes and other journals and magazines of France, Italy, Belgium, and Switzerland; and her writings on Albanian literature stirred up a notable literary and national movement amonest the able literary and national movement amongst the Albanians. She was made a member of several Albanians. She was made a member of several learned societies, and an honorary citizen of the See Cecchetti, Dora d'Istria Greek kingdom.

(1871), and an article in Scribner's Magazine for December 1878.

Chilan', a province of Persia, the western portion of the narrow strip of country lying between the Elburz range and the Caspian Sea, is separated from Russian Cancasia on the north-west by the from Russian Cancasia on the north-west by the river Astara. Area, 4251 sq. m. Owing to the lowness of the land, the province is subject to frequent inundations, and during great part of the year is little better than a swamp. There are dense furests, chiefly of oaks, maples, ashes, limes, &c., and a tropical luxuriance of vegetation. Extensive plantations of fruit and nulberry trees are grown, these last for the production of silk. The soil is extremely fertile, bearing barley, wheat, fruirs, and great quantities of rice. Animal life is abundant. The lisheries in the Caspian are very productive. The population, estimated at 150,000 to 250,000, are principally of Iranian descent, mingled with Kurdish and Turkic immigrants, and nearly all are Shiite Mohammedans. The climate is moist, changeable, and unhealthy. Storms are very violent.

Ghilzais, an Afghan tribe. See Arghanistan. Ghirlandajo. Domenico Curradi, nick-named Il Chirlandajo ('the garland-maker'), Italian painter of the early Florentine school, was born in 1449 at Florence. As a youth he was apprenticed to a goldsmith, probably his father, the maker of metal garlands; and it was not until his thirty-first year that he became known as a painter. He painted principally frescoes, and in his native city. The church of Ognisanti there contains from his hand a St Jerome and a Last Supper (1480); the Palazzo Vecchio, the Apotheosis of St Zenobius (1481-85); veceno, the Apotheosis of St Zenomias (1401-85); the chirch of S. Trinith, six subjects from the life of St Francis (1485) and an alter-piece, the 'Adoration of the Shepherds' (now in the Florentine Academy); the choir of S. Maria Novella, a series illustrating the lives of the Virgin and the Baptist (1490). Between 1482 and 1484 he painted for Pare Sixty IV. for Pope Sixtus IV., in the Sistine Chapel at Rome, the excellent fresco 'Christ calling Peter and Andrew,' and about the same time two pictures in the chapel of St Fina at San Gimignano. Besides these he also executed some easel pictures of great merit, as 'Adoration of the Magi' (1488), in the church of the Innocenti at Florence; the 'Visitation of the Virgin' (1491), in the Louvre; the 'Adoration of the Virgin by the Saints, in the Uffizi at Florence; and 'Christ in Glory,' at Volterra. All these are painted in tempera, and are not free from a certain hardness of outline and of not free from a certain hardness of outline and of colour. His freecess are generally characterised by excellent composition, good knowledge of perspective, strength in the outlines, except in the case of feet and hands, and propriety of expression, but ofton show a tendency to erndeness in colouring. Ghirlandajo inaugurated at Florence the practice of introducing into his sacred pictures portraits of his contemporaries; and the same fondness for local colour is frequently discernible in his landscape hackgrounds. He also executed mosaics, that of the 'Amunication' in the cathedral of Florence being especially celebrated. He died at Florence, 11th January 1494. Michel Augelo was for a time

one of his pupils.

His son Ridolfo (1483-1561) was a painter of considerable merit, whose best pictures are those which show the influence of Fra Bartolommeo and Raphael, such as two scenes from the 'Life of St Zenobius' (in the Uffizi), 'Asconsion of the Virgin' (at Prato), and 'Adoration of the Shepherds' (1510, at Pestli).

Ghizeh. See Gizeii. Ghizni. See Ghazni. Ghoorkhas. Sec Goorkhas.

199

Ghost-moth (Hepialus humuli), a species of moth very common in many parts of Britain, of which the caterpillar, popularly known as the 'Otter,' often commits great ravages in hop gardens, devouring the roots of the plants. It feeds also on the roots of the nettle, burdock, and some other plants. The moth belongs to a small family (Hepialidæ), often popularly called Swifts from

GHOST-MOTH



Ghost-moth (Heniulus humuli): caterpillar (a) and chrysalis (b).

their rapid flight. The antennæ are short, the wings long and narrow, the entire size about two inches across. The male is entirely of a satiny white colour above, and the female yellowish and reddish with darker markings; both sexes are brown on the under side. They are to be seen flying about in the twilight, generally over lawns and pastures, not unfrequently in churchyards. From this circumstance, and from the white colour of the males and their sudden disappearance in the imperfect light on their folding their wings or rising above the level of the spectator's eye (so that the brown part is turned towards him), they derive their name. The caterpillar, which is sometimes two inches long, is yellowish-white, with scattered hairs. It spins a large cylindrical cocoon among the roots on which it has been feeding, and then becomes a chrysalis. Two other common species of generally similar habit are H. lupulinus and H. hectus.

Ghosts. See Apparitions.

Ghoul. See Vampire.

Ghur, or GHORE, a mountainous district of western Afglianistan, lying south-east from Herat and north-west from Kandahar. Ronghly speaking, it coincides with the ancient Paropanisus and the medieval Gharshistan. It is a region, however, about which next to nothing is known, except that it is inhabited by Hazaras and Eimaks, and since 1845 has been included in the territory of Herat.

GHURI, a dynasty of princes who had the scat of their empire in the country of Ghar, and ruled over Persia, Afghanistan, northern Hindustan, and Transoxiana. We first read of Ghar in connection with Mahmud of Ghazni and his son Masaud, the latter of whom subjugated the region in 1020. About a century later Malik Izzuddin made himself ruler of all the Ghûr country. His son, Alauddin Jahansoz (the Burner), fell upon Ghazni, and took it and burned it to the ground. This prince's nephews, Ghiyassuddin and Muizuddin, established their power in Khorasan and Ghazni. The latter, crossing the Indus, then conquered successively the

provinces of Multan (1176), Lahore (1186), and Ajmere (1190), and, in the course of the next six years, all Hindustan as far south as Nagpur and seasiward to the Irawadi. It is from this epoch that the preponderance of Islam in Hindustan is dated. On the death of Mnizuddin the Indian states asserted their independence, the power of the Ghūri being confined to Ghūr, Scistan, and Herāt. This last feeble remnant was taken from them by the Shah of Kharezm about 1215. Some thirty years later the Chûr princes managed to revive something of their former power at Herût, which they retained by sufferance from the Mongols down to 1383, when the city was captured by Timur, and the Ghar sovereignty came to an end.

Gianibelli, Federigo, a military engineer, born at Mantina about 1530. During the siege of Antwerp by the Spaniards in 1585 he destroyed, by means of an explosive ship, a bridge built by the latter across the Scheldt. Proceeding to England on the capitulation of Antwerp, he rendered great service in the preparations for resisting the Armada of 1588, by fortifying the Thames shore and devising the plan of sending the fire-ships into the enemy's fleet. He is said to have died in London, but when is not known.

Gianno'ne, Pietro, an Italian antipapal historian, was born 7th May 1676, at Ischitella, a village of Capitanata, in Naples. A barrister by profession, practising at Naples, he spent twenty years in the composition of a magnum opus, entitled Storia Civile del Regno di Napoli (4 vols. 1723). It led to his banishment; he took refuge at Vienna, Venice, and Geneva successively. Whilst at Geneva he published a bitter attack upon the papal pretensions in a work entitled Il Triregno. Then being decoved into Savoy in 1736, he was Gianno'ne, Pietro, an Italian antipapal his-Then, being decoyed into Savoy in 1736, he was arrested and confined at Turin nutil his death, 7th March 1748. A collection of Opere Postume appeared after his death (Lausanne, 1760); and in 1859 Mancini issued his Opere Inedite (2 vols. Turin).

Giants. A giant (Gr. gigas) is an individual whose stature and bulk exceed those of his species or race generally. Until the beginning of the 19th century it was universally believed that giants, of a size far exceeding those who are exhibited in our times, formerly existed, either as nations or as individual specimens. This belief was based on the asserted discovery of colossal human bones, on supposed scriptural evidence, and on the evidence of various ancient and medieval authors.

A reference to the first volume of Chvier's Ossements Fossiles will show that the bones of elephants, rhinocroses, mastodons, &c. have been exhibited and accepted as evidence of prehistoric giants. Even so good a naturalist as Buffon fell into this popular delusion, and figured the bones of an elephant as the remains of human giants. Isidore Geoffroy Saint Hilaire, in his Histoire des Anomalies de l'Organisation, notices several of the most famous of these cases.

The Scripture evidence, when carefully examined, does not amount to much. The Hebrew words nephilim and gibborim, which are translated giants in the Anthorised Version ('nephilim' and 'mighty men' in the Revised Version), were apparently not giants in our sense of the word. The height of Og, king of Bashan, is not given; we are only told the length of his bed. The height of Goliath is put at six and a half cubits, but by Josephus and the Septuagint at four cubits and a span—say 8 feet 9 inches. The Anakim and other tall races referred to in Scripture need not have been of superhuman size.

The classical evidence is abundant, but obviously untrustworthy. Thus, besides Homer's allusions to

cyclopes, giants, Polyphemus, and like legendary races or persons, Plutarch relates that Sertorius had the grave of Anteus, at Tingis in Mauretania, opened, and 'finding there his body, full 60 cubits long, was infinitely astonished, ordered the tomb to be closed, gave his confirmation to the story, and be closed, gave his commination to the story, and added new honours to the memory of the giant.' Pliny reports that an earthquake in Crete disclosed the bones of a giant 46 cubits in length, who was held by some to be Orion, and by others Otus. Descending to more certain evidence, there is no doubt that a height of between 8 and 9 feet, and which it of pare then 9 feet has been attained. probably of more than 9 feet, has been attained.
There is a skeleton in the Museum of Trinity College, Dublin, 8 feet 6 inches in height; that of Charles Byrne (1761-83), in the museum of the College of Surgeons of England, is 8 fect 2 inches; College of Surgeons of England, is 8 feet 2 inches; and that of a giant in the nuseum at Bonn is 8 feet; and the actual body with the soft parts attached was probably two or three inches longer than the skeleton. Byrne, for example, measured 8 feet 4 inches after his death, as we find recorded in the Annual Register, vol. xxvi. p. 209. He has often been confounded with Patrick Cotter or Official (1761–1868), where a beight is variously often been confounded with Patrick Cotter or O'Brien (1761-1806), whose height is variously given at 7 feet 10 inches, and 8 feet 7 inches. The Scottish giant in the service of Frederick William L of Prussia measured 8 feet 3 inches, and was notable in his regiment of giants. The Chinese giant Chang claimed to have grown from 7 feet 8 inches to 8 feet between his first appearance in London (1865) and his second (1880). The Austrian Losef Willschmidter (1805-87) was 8 feet 9 inches Josef Winkelmaier (1865-87) was 8 feet 9 inches.

Popular belief seems right in treating the Patagonians as the tallest race of men; the mean height being ascertained to be about 5 feet 11

inches.

It appears (1) that giants are of rarer occurrence than dwarfs; (2) that giants are usually of a lymplatic temperament, and of a very delicate complexion, often de-formed, and almost always badly proportioned; that their muscles are flabby, and their voice weak; while dwarfs are often perfectly well proportioned, and are strong for their size; (3) that giants are never long-lived—Byrne died at twenty-two, Magrath at twenty, Winkelmaierat twenty-two-while dwarfs seem to attain the full ordinary period of human existence; (4) that while giants usually exhibit a want of activity and energy, and are feeble both in body and mind, dwarfs are in general lively, active, and irascible. We know little of the causes which occasion the excessive development or the arrested growth on which

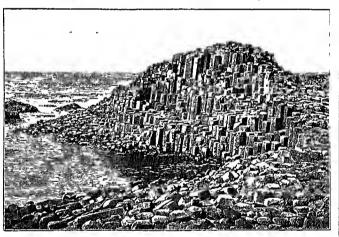
development or the arrested growth on which the production of giants and dwarfs depends.

DEFORMITIES.

Mythological Giants and Dwarfs. - Giants play a part in the mythology of almost all nations of Aryan descent. The Greeks, with hideous countenances, and having the tails of dragons, placed their abode in volcanie districts, whither they were fabled to have been banished after their unsuccessful attempt upon heaven, when the gods, with the assistance of Hercules, imprisoned them under Etna and other volcanoes. Their reputed origin, like the places of their abode, points to the idea of the marking allocations and the property of the state of th the mysterious electrical and volcanie convulsions of nature, which they obviously typify; and, in accordance with this view, they are said to have been of mingled heavenly and earthly descent, and

to have spring from the blood that fell from the slain Ouranos upon the earth, Ge, which was their mother. In the cosmogony of the northern nations, giants occupy a far more important place than the Greeks assigned to them, for here the first created being was the giant Ymir, called also 'Aurgelmir' or 'the ancient Chaos,' the progenitor of the Frost-giants (Hrimthutsar), among whom dwelt the All-Father before the creation of heaven and earth. How Ymir the first giant arose, and what came of the giants and their home Jotunheim, is an integral part of Scandinavian Mythology (q.v.). The giants have been held to be personifications of the powers of nature, of barbarism in conflict with a more civilised regime, and of heathen powers in conflict with Christianity. Even the boys' tale of Jack the Giant-killer has been held to have originated in the struggle of the Christian Welsh with the pagen struggle of the Christian Welsh with the pagan Anglo-Saxons. Swift's Brobdingnagians are the best known of modern imaginary giants. See Wood's Giants and Dwarfs (1868); Tylor's Primitive Culture (1871); Bollinger, Zwerg- und Riesenwuchs (1884); and Max. Mayer, Die Giganten und Titanen in der Antiken Sage und Kunst (1889).

Giants' Causeway (deriving its name from a legend that it was the commencement of a road to be constructed by giants across the channel to Scotland) is a sort of natural pier or mole, of columnar basalt, projecting from the northern coast of Antrim, Ireland, into the North Channel, 7 miles NE. of Portrush by an electric tranway (1883). It is part of an overlying mass of basalt, from 300 to 500 feet in thickness, which covers



The Honeycomb, Giants' Causeway.

almost the whole county of Antrim, and the eastern part of Londonderry. The basalt occurs in several beds, interstratified with protrusions of whin-dyke. Several of these beds are more of whin-dyke. Several of these beds are more or less columnar, but three layers are remarkably so. The first appears at the bold promontory of Fair Head; its columns exceed 200 feet in height. The other two are seen together rising above the sea-level at Bengore Head, the level one forming the Giants' Causeway. It is exposed for 300 yards, and exhibits an unequal pavement, formed of the tops of 40,000 vertical closely-fitting polygonal columns, which in shape are chiefly hexagonal, though examples may be found with 5, 7, 8, or 9 sides. There is a single instance of a triangular prism. The diameter of the pillars varies from 15 to 20 inches. Each pillar

is compact and homogeneous, and is somewhat sonorous when struck with a hammer. The Grand Causeway is itself formed of three canseways, the Little, Middle or Honeycomb, and the Grand Causeway. On the Little Causeway may be seen an octagon, pentagon, hexagon, and heptagon all together; on the Middle Causeway is the famous Wishing Chair, with two arms and a back, on a platform where the columns rise to a height of about 10 feet. On the Grand Causeway are pointed ont the Lady's Fan, an exact arrangement of five perfect pentagons surrounding a heptagon; the Keystone of the Causeway—a sunk octagon; and the single triangle. At the starting-point is the Giants' Loom, an imposing row of columns 30 feet high, each intersected by about thirty joints; to the left is the Giants' Well, to the right the Giants' Chair.

The best way to see the Causeway is to walk along it under the cliffs, and next over them, but he who would see the full grandeur of this wonderful strip of coast must row along it eastward as far as the Pleaskin. The 'Short Course' includes a visit to Portcoon and Runkerry Caves and the Causeway only; the 'Long Course' extends westward to the caves, and eastward to the Horseshoe Bay beyond Pleaskin and under Benbane Head. The various inlets and points along the coast, passed in order, are Portnaho, separated by the Stookan Rocks from Portganniay; next, after the Giants' Causeway proper is passed, Portnoffer, closed on the east side by the Giants' Organ, a row of imposing pillars the appearance of which at ance explains their name; after Roverin Valley Head is turned, Port Reostan, opening up into the Amphitheatre, fringed with cliffs 350 feet high, and reaching its eastern horn in the Chimney Point, the lofty stacks of whose rocks are said to have been fatally mistaken for the chimneys of Dunluee Castle by a Spanish Armada ship. The next hay is Spanish Bay, with the Spanish Organ, shut in by Benaumran Head, 400 feet high, between which and Pleaskin Head are the reefs called the Giants' Eyeglass and the King and his Nobles. The Pleaskin rices to a height of 400 feet, and is the noblest of all the Causeway cliffs. The prospect is unrivalled from Hamilton's Seat near its top, so named from the Rev. Dr Hamilton of Derry, one of the first to discover the Causeway (1786). Beyond it is the Horseshoe Harbour and the group of rocks called the Nurse and Child. After rounding Benbane Head we come in sight of Beugore Head (367 feet), below which the coast slopes more rapidly southward past the pillars known as the Four Sisters, the Giants' Peep-hole, and the Giants' Granny to the ruins of Dunseverick Castle.

Giants' Kettles, the name given in Norway to vertical pot-shaped, smooth-sided hollows excavated in rocks, usually filled up with rounded boulders, water worn stones, gravel, and other detritus. They are believed to have originated under the great glaciers or continuous mer de glace which formerly covered wide regions of northern Europe (see BOULDER-CLAY, GLACIAL PERIOD, PLEISTOCENE SYSTEM). They have probably been formed by water descending from the surface of the ice through moulins or glacial chimneys—setting stones and boulders in rapid rotation. They are thus comparable to the pot-holes which are so common a feature in the beds of rapid streams, particularly in the neighbourhood of waterfalls, where the stones have a gyratory motion imparted to them by the irregular movements of the water. As they rotate they gradually wear away the rock, and produce more or less steep-sided cavities. Giants' kettles occur in connection with the glacial deposits of many other countries besides Norway; as, for example, in Prussia.

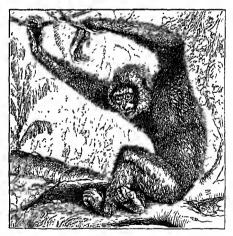
Giaour, the Italian spelling (popularised by Byron) of a Turkish word, applied by the Turks to all who reject Mohammedanism, especially to Enropean Christians. By some it is said to be derived from the Persian gâur, 'infidel;' by others to be a corrupt farm of the Arabic Kaifir, 'infidel' (cf. Kaifirs, the African people, and the Guebres, q.y.).

Giarre, a town of Sicily, in the province of Catania, on the castern slope of Mount Etna. The surrounding district produces excellent wine. Pop. (1881) 7819.

Giaveno, a town of Piedmont, 17 miles W. of Turin, with some silk-spinning, pottery-works, and iron-works. Pop. (1881) 5692.

Gibbet, a sort of gallows on which the bodies of criminals who had been guilty of particularly atrocious crimes were by order of the courts of instice suspended after execution, encased in an iron frame, near the spot where the crime was committed. This was done for the purpose of striking terror into the evil-minded, and of allording 'a comfortable sight to the relations and friends of the deceased.' The practice, first recognised by law in 1752, was finally abolished in 1834.

Gibbon (Hylobates), a genus of tail-less anthropoid apes, natives of the East Indies. They are nearly allied to the orangs and chimpanzees, but are of more slender form, and their arms so long as almost to reach the ground when they are placed in an erect posture; there are also naked callosities on the buttocks. In this respect they differ from the other Anthropoid Apes (q.v.), and are allied to some of the Catarrhini; in other respects also the Gibbons are the lowest among the anthropoid apes, and connect them with the Catarrhini. The gibbons are inhabitants of forests, their long arms enabling them to swing themselves from bough to bough, which they do to wonderful distances, and with extreme agility. They cannot, however, move with ease or rapidity on the ground. The conformation of the hinder extremities adds to



The Active Gibbon (Hylobates agilis).

their difficulty in this, whilst it increases their adaptation to a life among the branches of trees, the soles of the feet being much turned inwards. None of the gibbons are of large size. There are some eight or ten species. The Common Gibbon, or Lar Gibbon (H. lar), is found in some parts of India, and in more castern regions. The Active Gibbon (H. agilis), found in Sumetra, is particularly remarkable for the power which it displays of flinging itself from one tree to another, clearing

202 GIBBON

at once, it is said, a distance of forty feet. The Wow-wow (H. leuriscus) is a gibbon found in Malacca and the Sunda Isles. H. leurogenys is from Siam. The Hoolock (H. Hoolock) is a native of the Garrow Hills. The Siamang (H. syndactylus), a Sunnatran species, differs from the rest of the genus in having the first and second fingers of the hinder extremities united together up to the second joint; it resembles the Orang (q.v.), and differs from the true gibbons in having a large air-sac opening into the windpipe. All the gibbons are of gentle disposition, and easily domesticated. At present the gibbons are confined to south-eastern Asia and some of the larger islands hordering upon the continent, but it is possible that Dryopitheous famul fossil in Tertiary strata of the south of France, of the size of a man, is referable to the same group. See figure of the skeleton at Anthropolid Apes.

Gibbon, EDWARD, the greatest of English, perhaps of all historians, was born at Putney, near Lundon, 27th April (8th May in new style) 1737, the eldest, and sole survivor beyond the years of infancy, of the seven children of Edward Gibbon and of Judith Porten. In Gibbon's case the task of the biographer has been made easy by his own antobiography, which comes down to within five years of his death, and which with all its exquisite art is perhaps the most veracious example of its class in the English tougue. Gibbon's parents were both of good family; his father, a country gentle-man of a nature kindly but weak, and himself the son of an able fluancier who lost a fortune in the South Sea bulbble, and made another before his death. The boy's childhood was sickly from a strange nervous affection, which contracted his legs alternately and caused excrueiating pain. The very preservation of his life he ascribed to the more than maternal care of his aunt, Catherine Porten, whose devotion he repaid with a constant affection. His studies were desultory perforce, and two miserable years at Westminster was all the regular schooling that he got. After his four-teenth year his weakness began to disappear, and teenth year his weakness began to disappear, and his father, without permitting him to wait until he was adequately prepared, carried him off to Magdalen College, and entered him as a gentleman commoner, April 3, 1752. At no period in its history had Oxford reached such a depth of degeneracy. 'The fellows of my time,' says Gibbon, 'were decent easy men who supinely enjayed the cites of the founder; their days were Gibbon, were decent easy men who supposes enjoyed the gifts of the founder; their days were filled by a series of uniform employments; the chapel and the hall, the coffee-house and the common room, till they retired, weary and well satisfied, to a long slumber. From the toil of reading, or thinking, or writing, they had absolved their conscience; and the first shoots of learning and ingennity withered in the ground, without and ingenincy withered in the ground, without yielding any fruits to the owners or the public. . . . Their conversation stagnated in a round of college business, Tory politics, personal anecdotes, and private scandal; their dull and deep potations exensed the brisk intemperance of youth; and their constitutional toasts were not expressive of the most lively loyalty for the house of Hamover.' Such was the atmosphere into which Gibbon was tlung at the age of lifteen, 'with a stock of erndition which might have puzzled a doctor, and a degree of ignorance of which a schoolboy might have been ashamed,' and here he spent fourteen months—'the most idle and unprofitable of my whole life; the reader will pronounce between the school and the scholar.' From his childhood he had been foud of religious disputation, and his incursions into the bewildering mazes of a great controversy made him at sixteen a convert to the Church of Rome, and shut the gates of Oxford inpon him. His father next placed him under the care of the poet and deist Mallet, but hy his philosophy the young enthusiast was 'rather scandalised than reclaimed.' To effect his cure from popery he was next sent to Lausanne to board in the house of a Calvinist minister, M. Pavilliard, a poor but worthy and intelligent man, who judiciously suggested books and arguments to his young charge, and had the satisfaction of seeing him reconverted to Protestantism. (Fibbon tells us that 'the various articles of the Romish creed disappeared like a dream; and after a full conviction, on Christmas-day 1754, I received the sacrament in the church of Lansanne. It was here that I suspended my religious inquiries, acquiescing with implicit belief in the tenets and mysteries which are adopted by the general consent of Catholics and Protestants.' He lived for nearly five years in M. Pavilliard's house, respecting the minister, and enduring with greater or less equanimity the 'uncleanly avarice' of his wife; and here he began and carried out with rare steadfastness of purpose those private studies in French literature, but especially in the Latin classics, which, aided by his prodigious memory, and with hardly an equal. Here also he fell in love with Mademoiselle Suzanne Curchod, the beautiful and accomplished danghter of the obscure minister of Crassy, who lived to become the wife of the great French minister and financier, M. Necker, and the mother of the gifted Madame de Staël. He found on his return to England that his father would not hear of the 'strange alliance,' and in the calm reflection of thirty years later he adds, 'After a painful struggle I yielded to my fate; I sighed as a lover, I obeyed as a son; my wound was insensibly healed by time, absence, and the habits of a new life. My cure was accelerated by a faithful report of the tranquillity and electriuless of the lady herself, and my love subsided in friendship and esteem.' They remained constant friends in later life, and the former lover during a visit to Par

Gilbon returned to his father's house in 1758. He was well received, and 'ever after continued on the same terms of equal and easy politeness.' He became much attached to his step-mother, and the two 'easily adopted the tender names and gennine characters of mother and son.' He brought with him the first pages of a little book which at length he published in 1761 in French, under the title of Essai sur l'Étade de la Littérature. He had joined the Hampshire militia, and for the next two and a half years led a wandering life of military servitude as a captain—an irksome discipline, but one which he admits was not unprofitable to him. 'The discipline and evolutions of a modern battalion gave me a clearer notion of the phalanx and the legion; and the captain of Hampshire grenadiers (the reader may smile) has not been useless to the historian of the Roman empire.' Meantime he revolved within his mind many projects for a historical work, and, the militia being disbanded, visited Paris and Lamsanne, and extended his travels into Italy. 'It was at Rome,' he tells us, 'on the 15th of October 1764, as I sat musing amidst the ruins of the Capitol, while the harefooted friars were singing vespers in the temple of Jupiter, that the idea of writing the decline and fall of the city first started into my mind. But my original plan was circumscribed to the decay of the city rather than of the empire; and though my reading and reflections began to point towards that object, some years elapsed, and several avocations

GIBBON 203

intervened, before I was seriously engaged in the

execution of that laborious work.

The of the projects taken up and abandoned after two years' preparatory studies was a history of Switzerland in conjunction with his friend Deyverdin, with whom also he planned and actually printed two volumes of a periodical work entitled Mémoires Littéraires de la Grande Bretagne (1767-68). Another work was his anonymous Critical Observations on the Sixth Book of the Æneid, a bitter attack upon the paradox advanced in Warburton's Divine Legation, that Virgil in the sixth book of his Æneid, in the visit of Æneas and the Sibyl to the shades, allegorised his hero's initiations, as a lawgiver, into the Elensinian mysteries. In 1770 his father died, leaving his affairs in disorder, from which Gibbon within two years contrived to extricate himself, and settle in London. In 1774 he entered parliament as member for the borough of Liskeard at the beginning of the struggle with America, and 'supported with many a sincere and silent vote the rights, though not, perhaps, the interest of the mother-country.' He sat afterwards also for Lymington, altogether for eight sessions, without ever summoning conrage to speak. In a letter (1775) to Holroyd (the future Lord Sheffield) he writes: 'I am still a nunte; it is more tremendous than I imagined; the great speakers fill me with despair; the bad ones with terror. His constant support of government was rewarded in 1779 by a post as one of the Lords Commissioners of Trade and Plantations, which brought a welcome addition to his income of over \$700 a year, but of which he was deprived three years later on the suppression of the office through the exertions of Burke.

After the labours of seven years and infinite After the labours of seven years and infinite fastidiousness in its composition, he published the first volume of his Decline and Full of the Roman Empire in February 1776. Its success was immediate, and it was not for some time that the religious world awakened to the insidiously dangerous character of the attack upon Christianity in the 15th and 16th chapters, which while not formally denying the 'convincing evidence of the doctrine itself, and the ruling providence of its great author' weeced to account for the of its great anthor, proceed to account for the rapid growth of the early Christian eluurch by 'secondary' or merely human causes—most of them rather its effects. Of these he offered five: (1) the inflexible and intolerant zeal of the Christians; (2) the doctrine of a future life, improved by every additional circumstance which could give weight and efficacy to that important truth; (3) the miraculous powers ascribed to the primitive clutter; (4) the virtues of the primitive Christians; (5) the mion and discipling of the Christians; (5) the union and discipline of the Christian republie. Gibbon was by temper incapable of apprehending spiritual aspirations by sympathetic insight, and he assailed with sneer and innuendo what he did not understand yet instinctively dis-liked, but feared openly to attack. He was too worldly and altogether too much a true son of his eenting to estimate aright what was really in-worldly; and, moreover, this inability was intensi-fied by his own cold and composed temperament and the reflex effect of his peculiar experiences.

Hume, who was then slowly dying (March 1776), in a characteristic and highly complimentary letter said about these chapters: 'I think you have observed a very prudent temperament; but it was impossible to treat the subject so as not to give grounds of suspicion against you, and you may expect that a clamour will arise. The prophecy proved true, and Gibbon was ere long assailed by a fond discharge of 'ecclesiastical ordnance,' which he professes to have found but empty sound, 'mis-chievons only in the intention.' He claims to have

helped his assailants to being rewarded in this world. He only deigned to reply when Henry E. Davies of Oxford impogned 'not the faith, but the fidelity of the historian;' still, he would not print his *Undication* in quarto lest it should be bound and preserved with the history itself. He persevered assiduously with his great work, and had two more volumes ready in 1781. And now, having lost office, and finding it difficult to live easily in London upon his income, he determined to accept Deyverdun's invitation to settle down with him in his house at Lansanne. He started in September 1783, and spent the next four years in the midst of his 6000 volumes, in ealm and uninterrupted work, never moving the while a dozen miles out of the town. He had nearly completed the fourth volume hefore leaving London, the fifth was finished in twenty-one months, the sixth in little more than twenty-one months, the sixth in little more than a year. The conclusion must be told in his own memorable and toneling words: 'It was on the day, or rather the night, of the 27th of June 1787, between the hours of eleven and twelve, that I wrote the last lines of the last page, in a summerhouse in my garden. After laying down my len I took several turns in a bereaut, or covered walk of access which commands a propert of the country. acacias, which commands a prospect of the country, the lake, and the mountains. The air was temthe lake, and the mountains. The air was temperate, the sky was serene, the silver orb of the moon was reflected from the waters, and all nature was silent. I will not dissemble the first emotions of joy on recovery of my freedom, and, perhaps, the establishment of my fame. But my pride was soon humbled, and a sober melaneholy was spread over my mind, by the idea that I had taken an everlasting leave of an old and agreeable com-panion, and that, whatsoever might be the future fate of my History, the life of the historian must be short and precarious. A month later he started for England to superintend the printing of the work. The fourth volume took three months; the last two were issued in the May of 1788. He returned immediately to Lansanne, where within a twelvementh his much-loved companion Devverdan died-a blow which affected him deeply, and from which indeed he never fully recovered.
The state of France filled him with trouble, though
it was some solace to have the exiled Neekers
beside him at Coppet, near Lausanne. The letters between his old love and himself are creditable in the highest degree to the hearts of both. 'Come to us,' she writes, 'when you are restored to health and to yourself; that moment should always belong to your first and your last friend, and I do not know which of those titles is the sweetest and dearest to my heart.' But his last years were not happy; good living and want of exercise had brought on burdensome corpulency, and he began to be maked with the torture of gout. His aunt bad already died in 1786, Deyverdum and other fuvourite friends had quickly followed, and last came the unexpected death of his dear friend, Lady Sheffield. At once, though travelling was now terrible to him, he made up his mind to go to console Lord Sheffield, and within a month he was with him. After three months' stay at Sheffield Place, and a visit to his aged step-mother at Bath, he came to London, where a few days later he was seized with an attack of dropsy, the result of a rupture which he had neglected for over thirty years. An operation gave temporary relief, and he went again a little into society, but two months later he died, without apprehension or suffering, in St James's Street, London, 16th January 1704.
The monumental work of Gibbon is likely to

remain our masterpiece in history. The magnitude of the subject is nobly sustained by the dignity of the treatment, and the whole fabric stands out a marvellous bridge flung by genius and erudition

across the weltering centuries of confusion that separate the old world from the new. The glowing imagination of the writer gives life and vigour to the rounded periods and to the stately and pompons march of the narrative, and all defects of taste disappear in the admiration extorted from the most reluctant reader. Perhaps his most unique merit is his supreme and almost epic power of moulding into a lucid unity a bewildering multitude of details, and giving life and sequence to the whole. His prodigions memory moved freely under a ponderous weight of learning which his quickening imagination fused into a glowing stream of continnous narrative, which is yet, with all its detail, a marvel of condensation. The story of Constantinople is his greatest effort—his treatment of Julian, of Justinian, of the Arabs, and of the Crusades, the most splendid single episodes in our historical literature. He has painted in gorgeous colonis all the splendours of the ancient Paganism, and portrayed with matchless force every figure that crossed the stage of history for a thousand years; for the moral beauty of Christianity alone he has no enthusiasm-the heroism of its martyr-witnesses and its saints touches not his imagination nor warms his dramatic sense to life. This elemental defect set aside, few faults of detail have been discovered in his work, the cuduring merit of which it may be permitted to summarise in the words of a great modern master of history, whose own studies have followed closely in his track. That Gibhon should ever he displaced, says Mr Freeman, 'seems im-That wonderful man monopolised, so to speak, the historical genius and the historical learning of a whole generation, and left little indeed of either for hiscontemporaries. Heremains the one historian of the eighteenth century whom modern research has neither set aside nor threatened to set aside. We may correct and improve from the stores which have been opened since Gibbon's time; we may write again large parts of his story from other and often truer and more wholesome points of view; but the work of Gibbon as a whole, as the encyclopædic history of 1300 years, as the grandest of historical designs, carried out alike with wonderful power and with wonderful accuracy, must ever keep its place. Whatever else is read, must ever keep its place. Gibbon must be read too.

Lord Sheffield collected two volumes of his Miscellaneous Works in 1706, an enlarged edition of which he issued in 1814 in five octavo volumes. The best edition of The Decline and Fall is that of Dr W. Smith (8 vols. 1854–55), containing also the notes and corrections of Guizot, Wenck, and Dean Milman. There is a suggestive essay in vol. ii. (1878) of Walter Bagehot's Literary Studies, and a good study by J. Cotter Morison (1878) in the 'English Men of Letters' series.

Gibbons, GRINLING, an eminent English seulptor and wood-carver, was born at Rotterdam, 4th April 1648. Of English descent probably, he had for some time practised his art in England, when Evelyn found him carving on wood Tintoretto's 'Crucifixion;' and on Evelyn's recommendation he was appointed by Charles II. to a place in the Board of Works, and employed in the ornamental carving of the choir of the chapel at Windsor. His works display great taste and delicacy of finish, and his flowers and foliage have almost the lightness of nature. For the choir of St Paul's, London, he executed the foliage and festoons, and those in lime-tree which decorate the side aisles. At Chatsworth, at Burleigh, at Southwick, Hampshire, and other mansions of the English nobility, he executed an immense quantity of carved embellishment; the ceiling of a room at Petworth is regarded as his chefid wavre. He also produced several fine pieces in marble and bronze. Among these are the

statue of James II., Whitehall; the base of the statue of Charles I., at Charing Cross; and that of Charles II., at the Bank of England. He died in London, August 3, 1721.

Gibbons, Orlando, one of the greatest of English musicians, was born at Cambridge, 1583, and was probably brought up in the choir of one of the college chapels. His elder brothers, Edward and Ellis, were both eminent organists and composers. The chief events of Gibbons's short life are soon told. On March 24, 1604, he was appointed organist of the Chapel Royal, London. In 1606 he took the degree of Mis. Bac. at Cambridge, and in 1622, at the instance of Camden, that of Mis. Doc. at Oxford. His exercise was the well-known 8-pt. anthem, 'O Clap your Hands.' In 1623 he became organist of Westminster Abbey. In May 1625 he went with the king and court to Canterbury, to await the arrival of Henrietta Maria, and while there, on June 5, died of what appears to have been apoplexy (see the official letter and report of the physicians in the Athenaum, November 14, 1885, p. 644). His monument, with a birst, is in the north aisle of the nave at Canterbury, and a portrait is in the music-school, Oxford. His wife's name was Elizabeth Patten; and of their seven children six survived him, two of whom, Chistopher and Orlando, were musicians.

Gibbons's reputation as an organist was great; he 'had the best hand in England.' His compositions are not innierous, but most of them are pure gold. The best known are his Morning and Evening Service in F; the anthems, 'O Clap your Hands' and 'God is gone up' (8 pts.), 'Hosanna,' 'Lift up your Heads' (6 pts.), and 'Almighty and everlasting God' (4 pts.); the 5-pt. madrigals, 'The Silver Swan,' 'O that the learned Poets,' and 'Dainty, fine, sweet Bird.' Besides these he left Preces and hymns, a score of anthems, both full and verse; seventeen madrigals, the remainder of the volume published in 1612; nine fantasics for strings (1611); six pieces for the virginals, included in 'Parthenia' (1612), and a few other miscellaucous pieces. These show him to have been not only learned, as all musicians of that time were learned, but animated by grace, dignity, and scutiment, such as were possessed by none of his predecessors in the school. Nothing more noble and spirited was ever written than his 'Hosanna,' nothing more touchingly religious and beantiful than his 'Ahnighty and Everlasting,' or 'The Silver Swan.' In these exquisite compositions the art disappears, and the sentiment of the words is immediately seized. His Scrvice, for propriety, dignity, and beanty, remains above all that preceded or followed it. It and the anthems named

above retain their constant place in English choirs.

With Gibbons the great church school of England came to an end. Byrd had died in 1623, two years before him, and Bull, Weelkes, Dowland, and others of the old giants departed just at this very date. Felix opportunitate mortis, non enim vidit—. The great troubles followed very shortly, and the death of the king and the destructions of the Civil War; music was all but extinguished; and the new school began on fresh foundations with the Restoration, in the persons of Pelham Humfrey, Blow, and Purcell. But Orlando Gibbons is the culmination of the ancient musical art of our country, and as long as voices can sing and hearts can delight in real beauty he will remain at the head of the English church school of music. For the full list of his works and other details, see Grove's Dictionary of Music and Musicians, i. 594, and iv. 647.

Gibbous, a term signifying 'protuberant,' swelling out,' applied to bodies which are double-

convex, and particularly to the moon, when she is within a week of the full.—GIBHOSITY (Lat. gibbus, 'humpbacked') is a state of disease characterised by protuberance of a part of the body; chiefly applied to lumpback or other distortions depending on disease (Rickets, q.v.) of the spinal column.

Gibeah, a Hebrew word signifying a 'hill,' and giving name to several towns and places in ancient Palestine. Gibeah of Benjamin, 4 miles N. of Jerusalem, near Ramah, was the scene of the story of the Levite (Jndges, xix.), and was the residence, if not the birthplace, of King Saul. It has been identified with the modern village of Jeb'a.

Gibel. See CARP.

Gibeon, a city of ancient Palestine, a place of great natural strength, on a hill in a fertile plain among the mountains of Benjamin, 5 miles NW. of Jerusalem. At the conquest of Camaan by the Israelites under Joshna, it was inhabited by Hivites. By a clever stratagem the Gibeonites ensured the alliance and protection of the invaders, but, their deecit being afterwards found out, they were reduced to a condition of servitude, being made 'hewers of wood and drawers of water unto all the congregation.' When the five kings of the Antorites besieged Gibeon for having entered into a traitorous compact with the common enemy of all the Canaanites, Joshua hastened to its help, and overthrew the besiegers with great slaughter. It was there that Joshua, in the words quoted from the book of Jashar (Joshua, x. 12), commanded 'the sun to stand still upon Gibeon, and the moon in the valley of Ajalon.' Gibeon is aften mentioned in the Old Testament; and on its site there still stands a village with an old church.

Gibraltar (Span. Gibraltar'), an isolated mass of rock, in the SW. of Spain, rising to an altitude of 1408 feet, 3 miles in length and 4 mile in average breadth, is situated at the extremity of a low sandy peninsula, which connects it on the north with Andalusia; its most southern headland, Point Enropa, is in 36° 2′ 30° N. lat. and 5° 15′ 12″ W. long. Its western side is washed by the Bay of Gibraltar, called also the Bay of Algeciras; and at the foot of the rock, on this same side, is the town of Gibraltar, which consists of two parts, the South Town, alove the dockyard, and the North Town, which has narrow streets and many mean honses, and is inhabited by a motley agglomeration of English, Spaniards, Jews, and Moors. Pop. (1887) 24,139, including the garrison of 5000-6000 men. Annongst the more important of the public institutions must be mentioned the numerous barracks; the governor's official residence, called the Convent—it formerly belonged to the Franciscans; the naval hospital; the Alameda Gardens, stretching between the North Town and the South Town; the signal station, crawning the central eminence of the rock, 1255 feet high; the remains of the ancient Moorish castle, founded in the 10th century; and the lighthouse, on Point Europa, erected in 1841, whose light, 150 feet above the sea, is seen for 20 miles. At the northern base of the rock is the open space called the North Front, extending as far as the British lines; here are the cemetery, the cricket-ground, the raceourse, &c. Between the British and the Spanish lines is the neutral ground, which is uninhabited. On the west side of the rock, south of the Alameda Gardens, are the naval victualling-yard and the naval dockyard. This latter dates from the 18th century, and is protected on the south by a new mole, a quarter of a mile long. The merchant-vessels that visit the town find good anchorage in the Bay of Gibraltar, 8 miles deep by 5 wide. Gibraltar has been a free port since its capture

by the British. Until the introduction of steam-ve-sels, especially for a score of years from 1808, it was one of the chief commercial emporia of the Mediterranean. Nevertheless, the burden of the vessels entering and clearing increased from 5,128,484 tons (of which 4,165,345 were British) in 1878 to 10,499,851 (8,541,370 British) in 1887. Gibraltar is an important coaling station. The governor exercises all the functions of the legislative and executive; but the local affairs of the town are managed by a body of sanitary commissioners. Since 1842 Gibraltar has been the see of an Anglican bishop with an extensive jurisdiction.

Almost the entire rock bristles with artillery. Every spot from which a gan can be brought to bear is occupied by cannon, which oftentimes quaintly peep out of the most secluded nooks, among geranimus and flowering plants, while huge piles of shot and shell, some of enormous size, are stowed away in convenient places, secrened from an enemy's fire, but all ready for use.' The approaches from the north, across the flat isthmus connecting the rock with Spain, and from the sea, the south and south-west sides, are guaded by a great number of very powerful batteries,



mounted with guns of the heaviest calibre, and by fortifications so strong in themselves and in their relative bearing on each other, that the rock may fairly be regarded as impregnable so long as a sufficient garrison remains for its defence, and sufficient provision for the maintenance of the troops and any civil inhabitants suffered to reside there during hostilities. Moreover, a sea-wall, defended by a system of flanking bastions, and strengthened by a breakwater, constructed in 1846, extends along the western base of the rock from the new mole to the old. Towards the north and north-west the defences are aided by a series of fortified gallerics, some 2 to 3 miles in length. These consist of an upper and a lower tier: in the former are two large halls; one, St George's, is 50 feet long by 35 wide. Port-holes are cut in these galleries for cannon at intervals of 12 yards.

The castern side is so precipitous as to be altogether secure from assault. The annual cost to gether secure from assault. The annual cost to the imperial government of maintaining the garrison and fortifications averages about £330,000. In these days, however, of steam-ships and heavy long-range guns, the military importance of Gibraltar has certainly diminished.

The rock is composed of Jurassic limestone resting on a Silurian basement. The surface presents a bare and repellent aspect, principally due to the absence of trees; nevertheless, there are grassy, wooded glens in the nooks of the mountain. The rocky mass is perforated by numerous caverns, some of which penetrate for several lundred feet into the rock. The largest, called the 'Hall of St Michael,' is 220 feet long, 90 wide, and 70 high, and its floor is connected with the roof by stalactic pillars ranging up to 50 feet in height, linked by arches on the top. The entrance lies about 1100 feet above the sea. Large stalactics are found in most of the other caverus, and interesting fossils abound throughout the peninsula. Gibraltar is the only place in Europe where monkeys live wild (see BARBARY APE); but in 1881 the colony had dwindled down to about twenty members.

dwindled down to about twenty members.

Gibraltar has been known in history since the days of the early Phenician navigators. The Greeks called it Culpc, and it and Abyla (now Ceuta) opposite formed the Pillars of Herenles, long held to be the western boundary of the world. We have no certain information of its natural strength being made available for defensive or aggressive purposes until the year 711 A.D., when the Saracen leader Tarik, a general of the Calif Al-Walid, crossing from Africa for the invasion of the Visigothic kingdom, fortiled it, as a base of operations, and a ready point of access from the Barbary coast. From this chieftain it took the name of Gebel el-Tarik, or Hill of Tarik, of which Gibraltar is a corruption. One of the old towers of his early castle still remains. In 1302 Ferdinand II. of Castile won it from the Moors; but in 1333 it fell to the army of the king of Fez, whom a siege by the Castilian monarch failed to dislodge. In 1410 Yussuf, king of Granada, possessed himself of the fortress, which, however, was finally wrested from the Moors by the Spaniards in 1462, and by them refortified and strengthened in every way. A combined Datch and English force, however, under Sir George Rooke and Admiral Byng, and the Prince of Hesse-Darmstadt, after a vigorous bombardment, and a landing in force, compelled the governor to capitulate in 1704.

Since 1704 Gibraltar has remained continuously

in the possession of the British, in spite of many desperate efforts on the part of Spain and France to dislodge them. Before the victors had been able to add to the defences, their mettle was severely tried by two attacks in 1704-5. The most memorable of the sieges to which Gibraltar has been exposed commenced 21st June 1779, when, Britain being engaged in the struggle with its revolted colonies, and at the same time at war with France, Spain took the opportunity of joining the coalition, and made a most determined attempt to subdue the garrison of this isolated fortress. It was, however, defended with heroic valour by General Elliott (see HEATHFIELD) and 5000 men, including 1100 Hanoverians. Several times the defenders were on the point of starvation. On 26th November 1781, in a desperate midnight sally, the British succeeded in destroying the more advanced of the enemy's lines on the land side, in setting fire to many of his batteries, and in blowing up his principal depot of ammunition. At length in July 1782 the Spaniards were reinforced by the French, the Duc de Crillon took command of the assailants, and preparations were made for the grand assault.

Additional batteries were constructed on the land side, and floating batteries built to bombard the fortress from the sea. Covered boats destined to disembark 40,000 troops were at the same time prepared. The effective force with which General Elliott had to withstand these efforts comprised about 7000 men. The attack commenced on the 8th September by a furious bombardment simultane-The attack commenced on the 8th onsly on all sides, and it was kept up without intermission until the 14th; but by means of red-hot balls and incendiary shells the otherwise invulnetable floating-batteries were all set on fire and destroyed, and the attack was completely repulsed, with a loss to the heroic garrison of only 16 killed and 68 wounded. Since then the fortress has enjayed immunity from attack. See Drinkwater's History of the Siege of Gibraltar (1785); Gilbard's History of Gibraltar (1881); H. M. Field, Gibraltar (New York, 1889).

Gibraltar, STRAITS OF (anciently the Straits of Hercules), connect the Mediterranean with the Atlantic. They narrow toward the east, their width between Point Europa and Cape Centa being only 15 miles, at the western extremity 24; the narrow-est part measures 9 miles. The length (from east to west) is 36 miles. A constant surface-current which runs in from the Atlantic is counterbalanced by an under-current from the Mediterranean.

Gibson, John, sculptor, was born a market-Wales, in 1790, but from his tenth year was brought up at Liverpool, where at fourteen he was apprenticed to cabinet-making. This he exchanged apprenticed to cabinet-making. This he exchanged for carving, first in wood, then in stone, his love of art having manifested itself strongly even while he was a mere boy at school. He found a patron in Roscoe; and, proceeding to Rome in 1817, became a pupil of Canova, and after his death of Thorwaldsen. Gibson then fixed his residence in that city, and very seldom revisited his native country. At first he was a faithful follower of Canova where greatful afteress he woods his own country. At first he was a faithful follower of Canova, whose graceful softness he made his own. But, advancing to the study of the antique, he finally rose to ideal parity and a thorough realisation of the grace of form. Amongst his finest works may be mentioned 'The Hunter and Dog,' 'Thesens and the Robber,' 'Annazon thrown from her Horse,' the two bas-reliefs of 'The Homs leading the Horses of the Sun' and 'Phaethon driving the Chariot of the Sun,' and 'Hero and Leander.' In these the most characteristic trait is nethans In these the most characteristic trait is perhaps that of passionate expression; they are, moreover, that of passionate expression; they are, moreover, thoroughly classical, and are marked by a refined and noble severity. The innovation of tinting his figures (e.g. his Venus), which he defended by a reference to Grecian precedents, has not commended itself to the public taste. Among his portrait-statues, those of Huskisson, Dudley North. Peel, George Stephenson, and Queen Victoria are the best. In 1833 he was elected an associate in 1836 a member of the Royal Academy. associate, in 1836 a member of the Royal Academy, to which he left a representative collection of his works. He died at Rome, 27th January 1866. See Life by Lady Eastlake (1869).

Gibson, THOMAS MILNER, English politician, was born at Trinidad, 1807, and educated at Trinity College, Cambridge, where he graduated in 1830. He entered parliament for Ipswich as a Conservative in 1837; but shortly afterwards became a convert to Liberalism, and was returned for Manchester (1841). He had previously distinguished hinnelf by his advocacy of free trade; during the succeeding five years he occupied a prominent position among the orators of the Anti-corn-law League. When the Whigs came into office, in July 1846, he was made a privy-councillor and vice-president of the Board of Trade, but resigned office in April 1848. On the onthreak of the war with Russia he espoused the doctrines of the 'Manchester school,' or 'Peace party.' Whilst sitting for Ashton-under-Lyne (1857-68) he was appointed (1859) president of the Board of Trade. and also ad-interim president of the Poor-law Commission. The former office he held until 1866. It was mainly through Gibson's instrumentality that the advertisement duty was repealed in 1853, the newspaper stamp duty in 1855, and in 1861 the paper duty. From his defeat at Ashton-under-Lyne in 1868 till his death at Algiers, 25th February 1884, he took no prominent part in public life.

Giddiness. See Verrigo.

Gidding. See FERRAR, NICHOLAS.

Giddings, Joshua Reen, an American statesman, was born in Athens, Pennsylvania, 6th October 1795, removed with his parents to Ohio in 1806, was called to the bar in 1820, and elected to the Ohio legislature in 1826. He sat in congress from 1838 to 1859, and was one of the most distinguished, outspoken, and aggressive leaders of the anti-slavery unovement. In 1842 he was censured by a congressional vote (125 to 69) for his agitation, but at once resigned and appealed to his constituents, and was re-elected by a large majority. In 1861 he was appointed consulgeneral in Canada, and died at Montreal, 27th May 1864. He published a volume of speeches (1853), The Exiles of Florida (1858), and The Rebellion: Its Authors and Causes (postlum. 1864).

Gideon, the name of the greatest of all the indges of Israel. He was the youngest son of Joash, of the house of Abiczer, and lived with his father at Ophrah, in Manasseh. During his youth Israel was sunk in idolatry and sloth, and was oppressed by the plundering incursions of the Amalekites and Midianites. The young Gideon nursed his patriotic and religious wrath in quietness mit he saw that the people were ripe for resistance to the enemy. The Book of Judges gives us a dramatic glimpse of him 'threshing wheat by the wine press to hide it from the Midianites.' Confident in the assurance of supernatural direction, he mustered the people, next reduced the unwieldy host to a handful of resolute men, fell suddenly upon the enemy in the neighbourhood of Monat Gilboa, and routed them with great slaughter. The effect of the victory was most decisive, and Israel enjoyed 'quietness forty years in the days of Gideon,' who was magnaninous enough to decline the proffered crown. Gideon's name occurs also in Heb. xi. 32, as that of a hero by faith, but nowhere else. In 1 Sam. xii. 11 he is called Jernbbaal, and Kuenen, refusing to accept the explanation offered (Judges, vi. 31-32), thinks this his original name; Gideon ('the hewer' or 'warrior') being an epithet attached afterwards. There are good grounds for believing the history of Gideon's conquest, given in Judges, to be but a dramatised and epitomised account of the course and issue of a struggle that extended over a long period; and that his rôle as a religious reformer, instead of being completed in early youth, was a continuous occupation throughout a long life.

Gien, a town in the French department of Loiret, on the Loire, 38 miles SE. of Orleans, has manufactures of pottery. Pop. 6833.

Giesebrecht, Wilhelm von, historian, was born on 5th March 1814 in Berlin, and became professor of History at Königsberg in 1857, and in 1862 at Munich. He died in December 1889. His chief works are Geschichte der Deutschen Kaiserzeit (5 vols. 1855–82), coming down to 1164; Jahrbücher des Deutschen Reichs (1840); a translation of

Gregory of Tours (1851); Doutsche Reden (1871); Arnold von Breseia (1873).

Gieseler, Johann Karl Ludwig, a great German writer of church listory, was born 3d March 1793, at Petershagen, dear Minden. He made his studies at Halle, and in 1813 vohnteered as a soldier during the war of liberation. After the peace he returned to teaching, became convector of the gynnasium at Minden, next director of the new gynnasium at Cleves. His Entstehung und frihere Schicksale d. schriftlichen Erangelica (1818) demolished the prevalent theory of a primitive written gospel, and procured him the chair of Theology at the new university of Born. Hence he was called to Göttingen in 1831, where he became in 1837 a consistorial conneillor, and died 8th July 1854. His great work is the Lehrbuch der Kirchengeschichte (5 vols. 1824-57), of which the last two volumes were edited by Redepenning, who added also a sixth, the Dogmengeschichte, and prefixed a Life to the lifth volume. Gieseler's profound learning, judicial temper, and admirable faculty of throwing fresh light upon the original documents combine to make him an unusually satisfactory historian, and indeed he falls short of Neander only in his rarest gift—that profound spiritual sense to which he owed his insight. The English translation comes down only to the beginning of the Reformation; the American, to the peace of Westphalia.

Giessen, a town of Hesse-Darmstadt, is pleasantly situated at the confluence of the Wieseck and the Lahn, 40 miles N. of Frankforton-the-Main by rail. It is chiefly deserving of notice for its university (founded in 1607), which possesses well-appointed laboratories, collections, and museums, and a good library, with mywards of 50 professors, &c., and 500 students. Giessen has manufactories of tobacco, breweries, ironfoundrics, machine-shops, &c. In the vicinity considerable supplies of peat are cut. Pop. (1875) 13,980; (1885) 19,001. See three works by Buchuer (1879-86).

Giffen. ROBERT, statistician and writer on trade and finance, was born at Strathaven in Lamarkshire in 1837. He entered journalistic life in Scotland in 1860, and two years later removed to London, where he was connected with the Globe (until 1866), the Fortnightly Review, the Examiner (1868-76), and the Daily News (1873-76). In 1876 he was appointed chief of the statistical department of the Board of Trade, but resigned his connection in 1881. He was president of the Statistical Society from 1882 to 1884, and has published Stock Exchange Scaurities (1878), Essays in Finance (first series, 1879; 4th ed. 1886; second series, 1886), and numerous official reports and papers.

Gifford, ADAM, founder of the Scottish lectureships in natural theology, was born in Edinburgh in 1820, studied at the university there, and was called to the Scotch bar in 1849. He became sheriff of Orkney in 1865, was raised to the bench as Lord Gifford in January 1870, and died at Granton, near Edinburgh, 20th January 1887. By his will be left £25,000 to the university of Edinburgh, £20,000 each to Glasgow and Aberdeen, and £15,000 to St Andrews, to endow lectureships in natural theology, subject to no dogmatic tests whatsoever. The first lecturers appointed were Max Müller, E. B. Tylor, Andrew Lang, and J. Hutchinson Stirling.

Gifford, WILLIAM, man of letters, was born at Ashburton, Devonshire, in April 1757. Left an orphan at twelve, he was first a cabin-boy, then for four years a shoemaker's apprentice, till in 1776 his attempts at versifying attracted the notice of a local surgeon. With his assistance he proceeded two years later as a Bible clerk to Exeter College,

Oxford, and, after graduating in 1792, travelled on the Continent with Lord Grosvenor's son. His first production, the Bariad (1794), was a satire on the Della Cruscans (q.v.); in Scott's phrase, it 'squa-bashed them at one blow.' The Maviad (1796) was levelled against the corrupters of the drama, and An Epistle to Peter Pindar against Dr Wolcot, who retorted with A Cut ut a Cobbler. Gifford's who retorted With 1 cat the a Coolear. Glinders editorship of the Inti-Jacobiu (1797-98) procuring him favour with the Tory magnates, he was appointed to offices that jointly brought him £900 a year. In 1802 appeared his translation of Juvertham nal, and prefixed thereto an antobiography. He edited the works of Massinger, Ford, Shirley, and Ben Jonson, and in his notes assailed former editors with brutal ferocity. In 1809 he became the first editor of the Quarterly Review, and this post he filled to within two years of his death, on 31st December 1826. Gifford possessed much satuical acerbity and poison, but as a poet he holds no rank whatever. As translator and editor of the old English dramatists he did good service; but his labours in this field were marred by suspicion and malignity. As a critic he was bitterly partial and one-sided; and bis onslaughts on Hazlitt, Leigh Hunt, Lamb, Wordsworth, Shelley, and Kears have as little pretension to fairness and candour as has Hazlitt's own onslaught on him in the Spirit of the Age (1825).

Gift, in English law, means a gratuitous transfer of property. Any person is at liberty to do what he pleases with his own property, and to give it away with or without consideration, if he is so inclined. When he gives away goods or cluately, mere delivery of possession, accompanied by words of gift, is sufficient to transfer the property; and then the transaction is irrevocable. But if he does not give possession of the goods at the samo time, then, that the gift may be binding upon him, he must execute a deed or writing under seal. The reason of this is that a mere verbal promise, without some legal consideration, is nugatory and revocable; whereas, when a person executes a deed, he is estopped from ever afterwards denying it. Where the property given is not personal, but real, then a deed is in general absolutely necessary to transfer the property. A will is the most familiar example of a gift of property both real and personal, for the testator generally, in such a case, gives away his property gratuitously. A gift of personalty by will is called a legacy or bequest, and a gift of land is called a devise.

As sometimes the power of giving away property gratuitously is abused in order to defraud and defeat creditors, it is provided by statute that a voluntary conveyance, whether of chattels or land, made by a person who is at the time insolvent, shall be void as against such creditors; and they are entitled, accordingly, to recover the property from the donee (13 Eliz chap. 5). The gift, however, even in such a case, stands good against the donor himself. So, if any person give by deed gratuitously any land, and then sell the same land, the gift will be void against the bond-fide purchaser (97 Eliz chap. 1).

(27 Eliz. chap. 4).

There is a peculiar kind of gift, or rather a gift made in peculiar circumstances, called a donatio mortis causa—i.e. a gift of personal property made in immediate expectation of death, which is not meant to take effect unless the donor actually dies, and the donee survives him. Such gifts may be made by word of mouth; and they may be proved by the evidence of the donee himself—a rule quite inconsistent with the policy of the law, which requires a will to be duly executed and attested by disinterested witnesses.

In Scotland a gift may be made of goods in the same manner as in England; but it is usually called a donation. Gratuitous alienations by persons in insolvent circumstances are also held to be void as against creditous (stat. 1621, cbap. 18). Though it is competent in Scotland to make a gift of goods or money by merely delivering the possession thereof, accompanied by words of gift to the donee, still there is this peculiarity, that if the transaction is afterwards impeached it can only be proved in Scotland by the donor's writ or oath, no matter how many witnesses may have been present; whereas, in England, it can be proved by ordinary witnesses, like any other fact.

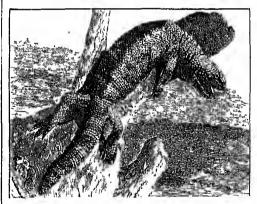
Gift, in the law of Scotland, is also often used to denote a grant or appointment by the crown or a court, such as gifts of non-entry, escheat, tutory,

Giga. or Gigue, the name of a short piece of music, much in vogue in olden times; of a joyful and lively character, and in $\frac{1}{3}$ or $\frac{1}{3}$ time, sometimes in $\frac{1}{3}$; used formerly as a dance-tune, and often introduced as a movement of a larger composition.—Jiy is a form of the same word: the Irish jig is a dance-tune in $\frac{4}{3}$ time.

Gijon, a seaport of Spain, stands on a peninsula and bay of the Atlantic, 20 miles by rail NE, of Oviedo. It manufactures tobacco, glass, and earthenware; exports butter, cheese, and fruits, and to Great Britain hazel-nuts and copper ore; and imports grain, flour, sugar, oil, iron, machinery, spirits, chemicals, and woven goods. Exports, nearly £100,000 in 1887; imports, £362,000. Here Jovellanos, a native of Gijon, founded the collegiate Asturian Institute. Pop. 30,591.

Gila, a river of North America, rising in the state of New Mexico, and flowing nearly 650 miles westward, across Arizona, till it joins the Colorado, about 75 miles above the fall of that river into the Gulf of California.

Gila Monster is a name commonly given to the poisonous lizard *Heloderma suspectum*, also called Sonoran Heloderm. It is one of the largest lizards of North America, and is found in the sandy



Gila Monster (Heloderma suspectum).

deserts of New Mexico, Arizona, and Texas. Its scales are brilliant orange and jet black. Its poisonous qualities it shares with its congener the *Helodermu horridum* of Mexico, which, like snakes, has grooved teeth and highly developed salivary glands at their bases. Its bite is rapidly fatal to small mammals and birds, and very injurious, though seldom fatal, to man. The heloderms are the only lizards ascertained to be venomous.

Gilbert, ANNE. See TAYLOR.

Gilbert, Sir Humphirey, English navigator, was born at Dartmonth, Devonshire, in 1539, and from Etou proceeded to Oxford. Then, abandoning

law for a career of arms, he did such good service against the Irish rebels as earned him knighthood and the government of Munster (1570), after which he saw five years' campaigning in the Netherlands. In 1576 appeared his Discourse on a North-west Passage to India, which was published by George Gascoigne, without his knowledge; two years later he obtained a royal patent 'to discover and occupy remote heathen lands not actually possessed of any Christian prince or people.' With his younger half-brother, Sir Walter Raleigh, he sailed in quest of the 'Unknown Goal;' but this expedition (1578-79), which had cost all his own and his wife's estates, was frustrated by internal dissensions, tempests, and a smart brush with the Spaniards. Nothing dannted, he once more set sail from Plymouth in June 1533, and in August landed in Newfoundland, of which he took formal possession for Queen Elizabeth. But, sailing southwards, he lost off Cape Breton the largest of the three vessels left out of five, so was forced to steer homewards with the Golden Hind and the Squirrel, the latter a 'frigate' of only ten tous burden. 'On Monday the 9th September,' writes the Golden Hind's captain, 'the Squirrel was near cast away, yet at that time recovered; and giving forth signs of joy, the general, sitting abaft with a book in his haud, cried out unto us in the Hind, "We are as near to heaven by sea as by land." The same Monday night the frigate's lights went suddenly out, and it was devoured and swallowed up by the sea.' So died Sir Humphrey Gilbert. See Hakluyt's Collection, vol. iii., and Lives of Raleigh by Tytler, St John, and Edwards.

Gilbert, Sir John, English painter, was horn in 1817 at Blackheath, near London. School-days over, he was placed at a mercantile house in the City, but after two weary years was pronounced to he wholly unfit for business, and allowed to follow his true vocation—art. Save for some lessons from Lance, the fruit-painter, he taught himself; his masters, the old masters—Rubens, Rembrandt, Velusquez. In 1836 he began to exhibit both in oil and water-colours; and in 1852 he was elected an associate, in 1853 a member, in 1871 the president of the Society of Painters in Water-colours, receiving soon after the honour of knighthood. He also became an A.R.A. in 1872, an R.A. in 1876, and a Chevalier of the Legion of Honour. Gilbert has well been called 'the Scott of painting.' His favourite subjects are historical, chivalric, antiquarian; and his bold, if somewhat monotonous style is familiar to every one through countless wood-engravings in the Illustrated London News, and in editions of Shakespeare, Scott, Don Quixote and Sancho Panza,' 'Education of Gil Blas,' 'Murder of Becket,' 'Joan of Arc entering Orleans,' 'Crusalers,' 'Wolsey at Leicester,' and 'Morning of Agincourt.'

Gilbert, William, author of a celebrated treatise on magnetism, was born in 1540 at Colchester. A member, and subsequently fellow of St John's College, Cambridge, he graduated in 1560, and in 1573 settled in London to practise as a physician. Eventually Elizabeth made him her court physician, and the same office was confirmed to him by James I. on his accession to the throne of England. After holding various offices in the College of Physicians, he was finally elected its president in 1600. He died a bachelor, 30th November 1603, either at Colchester or at London; he was buried at Colchester in the church of the Holy Trinity. His leisure time was largely given to the study of magnetism and chemistry. In the former subject he carried on some notable researches, principally contained in De Magnete,

Magneticisque Corporibus, et Magno Magnete Tellure (1600), and the posthumously published De Mundo nostro Sublunari Philosophia Nova (1651). In the former he established the magnetic nature of the earth, which he regarded as one great magnet; and he conjectured that terrestrial magnetism and electricity were two allied emanations of a single force—a view which was only demonstrated with scientific strictness more than two centuries afterwards by Oersted and Faraday. Gilbert was the first to use the terms 'electricity,' 'electric force,' and 'electric attraction,' and to point out that amber is not the only substance which when rubbed attracts light objects, but that the same faculty belongs to the resins, sealingwax, sulphur, glass, &c.; and he describes how to measure the excited electricity by means of an iron needle moving freely on a point. He also invented two instruments for finding latitude with the help of astronomical observations. See Asclepiad, July 1884.

Gilbert, William Schwenck, dramatist, was born in London, 18th November 1836, took the degree of B.A. at London University, was a clerk in the Privy-conneil Office from 1857 to 1862, and in 1864 was called to the bar. He contributed extensively to the magazines, and was for many years on the staff of Fun, in whose columns his delightful Bab Ballads first appeared. His stage-work began with a Christmas burlesque, Dulcamara (1866), which was followed by a succession of burlesques, and by dramas, comedies, fairy comedies, and operas. The fairy comedies include The Palace of Truth (1870), Pyymalion and Galatea (1871), The Wicked IVorld (1873), and Broken Hearts (1876). Among the comedies are the charming contrast, Sweethearts (1874), and Engaged (1877), more cynical and hopeless; his other plays include Charity (1874), Gretchen (1879), Comedy and Tragedy (1884), and an unsuccessful drama, Brantinghame Hall (1888). In conjunction with Sullivan (q.v.), besides Thespis and Trial by Jury, he has produced The Sorverer (1877), H.M.S. Pinafore (1878), The Pirates of Penzance (1880), Patience (1881), Iolanthe (1882), Princess Ida (1883), The Mikado (1885), Ruddigore (1887), The Yomen of the Guard (1888), and The Gondoliers (1889). In nearly all his better-known works (filbert displays fantastic humour that is often subtle, nearly always healthy in tone, and none the worse for a slight flavour of cynicism. His is the hand of a master, though his toneh is light; his quaint conceits, and the absurd earnestness with which they are worked out, appear to be inimitable by his contemporaries. In The Yomen of the Guard, however, he has left the grotesque vein, and presents some characters that are human and pathetic; it is a connedy set to nusic, in a sense that is true of none of its predecessors. The opens have been exceedingly popular in America, where a great part of the barrier between church and stage fell before the harriers between church and stage fell before the harriers of the facility of the facility of the harrier betw

Gilbertines, a religious order in the Roman Catholic Church, one of the few of English foundation. Its founder in 1148 was St Gilbert, a native of Sempringham, in Lincolnshire. The rule of the order was mainly derived from that of the Canons Regular of St Augustine. St Gilbert also founded an order of nuns after the Benedictine institute. Both orders were approved, and had nunerous convents in England at the time of the Reformation, when they shared in the general suppression.

Gilbert Islands, an archipelago in the Pacific, lying on the equator between 172° and 177° E. long. Area, 166 sq. m.; population about 36,800. The group consists of sixteen atolls, several of them triangular in shape, with two out-

lying hilly islands. Some of the atolls (e.g. Peru or Francis) are vising in clevation. Coeoa-nuts or Francis) are rising in clevation. Goeoa-nuts and copra are the chief, almost the only, productions of the group. The inhabitants, a mixed Malayo-Polyncsian race, closely resemble the Marshall islanders, though they speak a different language. Many of the people take service in Samoa, Fiji, &c. as labourers. The archipelago belongs to the jurisdiction of the British High Commissioner of the Western Pacific. It was discovered by Marshall and Gilbert in 1788.

GII Blas. See LE SAGE.

Gilboa, a bare chain of hills between 500 and 600 feet high, overhanging the site of the ancient city of Jezreel, and rising between the fertile plain of Esdraelon on the west and the green valley of the Jordan on the east. It is memorable as the scene of the defeat and death of King Saul and his three sons at the hands of the Philistines.

Gilchrist, ALEXANDER, Blake's biographer, was born at Newington Green, 1828, the son of a Unitarian minister who, conscientiously withdrawing from the office of the ministry, removed, when Alexander was a year old, to a mill near Reading. At the age of twelve (filebrist entered University College, London, where for four years he was a diligent scholar, and formed a friendship with the Rossettis. Leaving school at sixteen, he entered the Middle Temple in 1846, and sixteen, he entered the Middle Temple in 1846, and was called to the bar in 1849, but never practised. Maintaining himself chiefly by art-criticism, he married in 1851. After collecting in Yorkshire materials for a Life of Etty, he settled in 1853 at Guildford. The Life of Etty, warmly commended by Carlyle, appeared in 1855. The following year he removed to Chelsea, taking a house next door to the Carlyles. Here was composed his Life of Bluke, a labour of love engaging all his faculties. Before the task was yet completed, the author, in the full the task was yet completed, the author, in the full vigour of life, was cut off by scarlet fever on 30th November 1861.—His wife, ANNE GILCHRIST, 30th November 1861.—His wife, ANNE GILCHRIST, née Burrows, was born in London, 1828. In 1851 she married; in 1855 began to write for All the Year Round, in 1861 for Macmillan's. On her husband's death she undertook the completion of his Life of Blake (1863), to the second edition of which (1880) is appended a memoir of Alexander Gilchrist. In 1869 sho published in the American Radical Review 'A Woman's Estimate of Walt Whitman;' and it was largely to become personally acquainted with the poet that she spent three years in America (1876-79), when she wrote for Blackwood's 'Glimpses of a New England Village.' In 1883 appeared her Life of Mary Lamb, and in 1885, only a few months before her death that year, her last essay, 'A Confession of Faith.' See Anne Gilchrist: her Life and Writings, by her son (1887). (1887).

Gild. See Guild.

Gildas, surnamed by some Sapiens, by others Badonicus, the earliest native English historian, flourished in the 6th century, and wrote in Armorica (about 550-560) his famous treatise De Excidio Britannica Liber Querulus. This was first printed at Loudon in 1525, again in Gale's Scriptores XV (1601), where it was first divided into two XV. (1691), where it was first divided into two works, the History and the Epistle. The treatise falls naturally into two distinct portions: from the invasion of Britain by the Romans to the revolt of Maximin at the beginning of the 4th century, and from the close of the 4th century to the writer's own time. It is Gildas who narrates the story of the famous letter sent to Rome in 446 by the despairing Britons, commencing: 'To Ægidius (Ætius) consul for the third time, the groans of the Britons.' Gildas is a weak and wordy writer, and the value of his historical work has been assailed

by Sir T. D. Hardy and others, but is vigorously defended by Dr Guest; and it must be remembered that its latter portion was adopted without hesitation by Bede. Gibbon has described him in a single sentence as 'a monk, who, in the profound ignorance of human life, has presumed to exercise the office of historian, strangely disfigures the state of Britain at the time of its separation from the Roman empire. An edition of Gildas, edited by Joseph Stevenson, was published by the Historical Society in 1838; a new translation by J. A. Giles in 1841.

Gilding. There are many processes of gilding, varying with the nature of the substance to be gilded, and the kind of effect required to be produced, but they may all be classified under three heads—viz. (1) mechanical gilding, (2) chemical

gilding, (3) encaustic gilding, (2) Greinical gilding, (3) encaustic gilding.

The first is used chiefly for gilding wood, plaster of Paris, leather, paper, and other substances. If the object to be gilt is a picture or mirror frame, consisting of a plain wooden moulding, then, after getting a coat of oil-paint, from four to ten coats of getting a coat of oil-paint, from four to ten coats of fine whiting mixed with fine glue are put on, each in its turn being smoothed with pumice-stone and fine sand-paper. This done, a coat of gold-size is given to those parts which are not to be burnished; but those which are receive only a coating of clear animal size. Both of these prepared surfaces now receive the gold lost which is lold on by users of receive the gold-leaf, which is laid on by means of a broad thin brush called a *tip*, and further pressed on with a thick soft-haired brush. Those parts which have been gold-sized are in this way oil-gilt, and will stand washing; while such portions as have been gilt on the size preparation in order to be burnished will not bear soap and water. If the picture-frame is much enriched with fine raised ornament, the surface to be gilt is previously prepared with oil-paint and gold-size alone, as the coating with whiting destroys the sharpness of the work. The result, however, is more tender and less durable.

Japanner's Gilding.—Where gilt ornaments are to be put on a japanned ground, they are, by one method, painted with gold-size, and gold-leaf afterwards applied. By another method, rather more wards applied. By another method, rather more than the space the ornament is to occupy is wholly covered with gold-leaf, adhering with isinglass. The ornament is then painted on with asphaltum, which protects the gold beneath it while the superfusion for the superfluous leaf is being washed away. A little turpen-tine will then remove the protecting asphaltum so as to display the gilt ornament. Japanners' gold-size is a mixture of linseed-oil, gum-animi, and

vermilion.

False Gilding, although an old invention, has become in recent years an important trade in Germany. The moulding intended to be 'gilt' in this way is first covered with bright silver-leaf or tinfoil on a surface prepared as above, and then coated with a yellow varnish. Other substitutes for genuine gilding that are largely used consist in applying 'Dutch gold,' which is copper beaten out like gold-leaf, as in genuine gilding, or in using so-called 'gold paint,' which is finely powdered brass or other similar allow. or other similar alloy.

Chemical Gilding.—Metals are now usually gilded by the process of electro-gilding (see Electro-METALLURGY); but, besides this, various methods of elemical gilding have been adopted, and some

are still in us

Water or Wash Gilding, as it is somewhat inappropriately termed, consists in applying to metal a paste formed of an amalgam of gold, and afterwards evaporating the volatile mercury by heat, which leaves the gold firmly adhering to the surface of the metal.

Gilding by Immersion. - For this purpose a

solution of gold in nitro-muriatic acid is used which slowly attacks the metal to be gilded, and at the same time deposits on its surface an equivalent of gold. The method called Grecian Gilding is another similar process, in which gold is used dissurded in a calletter of the same process. solved in a solution of sal-ammoniac and corrosive

sublimate in nitric acid.

Most articles that are gilded by either of the Most articles that are gluder by clearing, are above chemical methods, or by electro-gilding, are submitted to an after process of colouring. consists either in acting upon the surface with a saline solution, and heating the article afterwards, or in coating it with a kind of varnish of beeswax and yellow ochre, and then burning this off. The colouring of jewelry, &c., made of gold alloyed with copper or brass, is performed by submitting the article to the action of a wixture of nitre, alum, and common salt, either dry or dissolved in water, heat being applied in either case. The baser alloy is thus removed from the surface, which becomes covered with a richly coloured film

of nearly pure gold.
Sword-blades, lancets, and other steel articles are gilded in fancy devices by drawing the design with a camel-hair pencil moistened in a solution of gold, prepared by agitating ether with a solution of terchloride of gold, and decanting the light liquid which floats on the top.

Silks, artificial flowers, ivory, bone, &c. may be gilded by immersing them in, or painting them with, a neutral solution of one part of terchloride of gold to four or five of water, and then exposing them in a vessel containing hydrogen gas, which readily combines with the chlorine, and reduces the gold to the metallic state.

the gold to the metallic state. Encaustic Gilding is usually applied to glass and porcelain. The gold is first obtained in a finely divided state by precipitating from the chloride with protosulphate of iron, or by simply heating the chloride. This powder is ground up with $\frac{1}{12}$ th of its weight of oxide of bismuth and some borax and gum water, and then painted on the ware. It is then heated till the borax is vitrified and the gold thereby fixed. Sometimes the gold is ground with the threshill, or an amalgam of gold is used. This has a brown dingy appearance when it leaves the kiln; the gold lustre is brought up by burnishing.

up by burnishing.

Gilding Metal.—The metal of which gilded goods are made is required to have as nearly as possible the colour of gold, so that when the surface-gilding is worn off at the more exposed parts the difference of colour will not be readily apparent. This is obtained by making a kind of brass having a much The following are three receipts from among a variety in use: (1) 6 parts copper, 1 common brass; (2) 4 parts copper to 1 Bristol brass; (3) 13 parts copper, 3 parts brass, 12 parts tin. The last is much harder than No. 1 or 2.

Gilead (in Eng., 'region of rocks') was a mountainous district on the east side of the Jordan, bounded on the N. by the Hieromax (Yarmuk), on the E. by the desert tablelands of Arabia, on the S. by Moah and Ammon, and on the W. by the Jordan. The highest ridges of Gilead are of dark-gray limestone. hower days are yellow and dark-gray limestone; lower down are yellow and purple sandstones. Though all is desolate above, on the slopes the vegetation is luxuriant, and forests of oak and terebinth occur. The name is not borne ont in the character of the country, and the glens exhibit great beauty and profusion of vegetation. The district was given to the tribes of Manassel, Gad, and Reuben, because of the multitude of their cattle, and as a frontier land was much exposed to invasion. There is mention of Gilead in Gen. xxxi. Ramoth (Es-Salt), Jabesh, and Jazer are three of the cities mentioned in Scripture. Lamence

Oliphant (q.v.), who speaks of Gilead as a country of vine and oil, with rich alluvial deposits, submitted a scheme to the government at Constantinople for its colonisation by Jews. The Dead inople for its colonisation by Jews. sea region he regarded as a mine of unexplored wealth, from which chlorate of potassium, petroleum, and bitumen might be exported. The local conditions he believed favourable to the introduction of immigrants. See Oliphant's Land of Gilead

Giles, Sr (Lat. Egidius), was an Athenian of royal descent, devoted from his gradle to good works. After giving away his entire patrimony, he lived two years with St Casarins at Arles in Provence, and then retired alone to a neighbouring desert, where he sustained nature upon herbs and the milk of a bind that came of herself to his cave. Once, on a hunting expedition, the king of France, following up the track of the hind, discovered Egidins, and compelled him to become the first abbot of a monastery he built upon the spot. Here he died. His festival falls upon 1st September. In the 6th century there was an abbot in Provence named Egidins, but the date of the saint is usually given as about the close of the 7th century. He carly became regarded as especially the patron of lepers, beggars, and cripples, and incult spread quickly over England, France, and Germany. In London, the church of St Giles, Cripplegate, and the leper hospital at St Giles-in-the-Fields, and in Edinburgh the High Kirk of St Giles still commemorate his name. See Rem-bry, St Gilles, sa Vic, ses Roliques, son Culte (Bruges, 1884).

Gilfillan, George, critic and essayist, was born in 1813 at Comrie, Perthshire, where his father was Secession minister. He studied at the university of Glasgow, and at the divinity hall of the Secession body, afterwards the United Presbyterian Church, and in 1835 he was licensed to preach the gospel. In 1836 he was ordained to the School gospel. In 1836 he was ordained to the School Wynd Church, Dundee, where he remained till his death, 13th August 1878. He attained considerable death, 13th August 1878. He attained considerable reputation as a lecturer and pulpit orator, and was incessantly industrious with his pen. His friends and fellow-citizens presented him with £1000 in 1877. His works are numerons. They display a rich but reckless fancy, and wide literary sympathies, although deficient perhaps in refinement of taste. Among them are A Gallery of Literary Portraits (3 vols. 1845-54); The Bards of the Bible (1850; 7th ed. 1887); The Martyrs of the Scottish Covenant (1852); History of a Man, largely autohiographical (1856); Alpha and Omega (1860); Night: a Poem (1867); Remoter Stars in the Church Sky (1867); Lives of Scott (1870), Dr W. Anderson (1873), and Burns (1880); and Sketrhes, Literary and Theological (1881). In 1853 he commenced an edition of the British Poets in 48 vols.

Gilghit, See Cashmere, Dardistan.

Gill (Low Lat. gillo, gello, 'a drinking-glass'), a measure of capacity, containing the fourth part of a pint, or the thirty-second part of a Gallon (q.v.).

GIII, JOHN, an eminent Baptist divine, was born at Kettering, Northamptonshire, November 23, 1697. He was mainly self-educated, yet became He was mainly self-educated, yet became proficient in Latiu, Greck, and Hebrew, and afterwards devoted himself nuch to the study of the rabbinical writers. He became in 1719 pastor of a rabbinical writers. He became in 1719 pastor of a Baptist church in Southwark; from which, in 1757, ho removed to a chapel near London Bridge, where he ministered till his death, October 14, 1771. His first important work was an Exposition of the Song of Solomon (fol. 1728), in which he vindicated the authenticity of that book against Whiston. His Exposition of the New Testament appeared in 174648; and subsequently his Exposition of the Old Testament (republished as one work, 9 vols., with a memoir, in 1810); A Body of Dutrinal Dismity (1769); and A Body of Practical Dismity (1770). He wrote also, as a controversialist, in defence of the doctrine of the Trinity and of Calvinism. Will received the degree of D.D. from Aberdeen in 1748. He was a robust Calvinist, devout, laborious, and learned.

Gillenia, a North American perennial genns of Rosacea, closely allied to Spiraea, and similarly suitable for shrubberies. The roots are often called Indian Physic, sometimes Wild Ipecac, Indian Hippo, Dropwort, and Bowman's Root.

Gillespie, George, a prominent figure among the Westminster Divines, was born at Kirkcaldy, where his father was parish minister, 21st January 1613. He pursued his studies at St Andrews, and early in 1638, after the power of the bishops had been pulled down, was ordained minister of Wennyss in Fife. He showed characteristic fearlessness at the Glasgow Assembly that same year, was translated to Edinburgh in 1642, and the year after was sent up, as one of Scotland's four representatives, to the Westminster Assembly, where his vigour, ability, and camestness enabled him to take a great part in the protracted debates on clurch discipline and dogma. His Aaron's Rod Blossoming, or the Divine Ordinance of Churchgovernment Vindicated (1646), is admittedly a masterly statement of the high Presbyterian claim for full spiritual independence. In 1648 Gillespie was appointed moderator of the General Assembly, but his already enfeebled frame soon sank under 1648.

Gillies, John, historian, was born at Brechin, in Forfarshire, January 18, 1747. He was educated at the university of Glasgow, and for several years acted as tutor to the sons of the Earl of Hopetonn. In 1778 he published a translation of the Orations of Isocrates and Lysias, with some Account of their Lives; and in 1786 his principal work, the History of Anrient Greece, 2 vols. It was extremely popular on its first appearance, but has dropped out of notice since the publication of the histories of Thirlwall and Grote. His View of the Reign of Frederick: II. of Prussia appeared in 1789. In 1793 he was appointed historiographer to the king for Scotland. He also published a translation of Aristotle's Ethics and Politics (1797), and of Aristotle's Rhetoric (1823), and a History of the World from Alexander to Augustus (2 vols. 1807-10). He died at Clapham, February 15, 1836.

Gillingham, a market town of Dorsetshire, on the Stour, 22 miles by rail W. of Salisbury. Near it are the 'Pen Pits,' thought variously to be quarryholes or prehistoric dwellings. Pop. of parish, 4131.

Gillis Land, Polar land NE of Spitzbergen, first sighted in 1707 by Gillis, a Dutchman, in 81° 30 N. lat. and 36° E. long, but not visited by him. Some geographers identify it with King Charles or Wiche Land, one of the Spitzbergen group, situated in 79° N. lat., and between 26° 30′ and 32° 30′ E. long.

Gillott, Joseph, born at Sheffield on 11th October 1799, shares with Sir Josiah Mason the credit of having brought the manufacture of steelpens to its present state of high perfection (see Pens). He died 5th January 1872.

Gillray, James, an English caricaturist, born at Chelsea, of humble parentuge, in 1757. He first became known as a successful engraver about 1784, and between 1779 and 1811 issued as many as 1200 caricatures, numbers of which, it is said, 'were etched at once upon the copper without the assist-

ance of drawings.' They are full of broad humour and keen satire, the subjects of his ridicule being generally the French, Napoleon, George III., and the principal English politicians; he also employed his talents in castigating the social follies of his day. He died in London, 1st June 1815. Gillray lived for many years in the house of the printseller, Miss Humphrey, in Loudon. During the last four years of his life he was insane. His caricatures, which were very popular and not without influence upon public epinion, often rise to a lofty levol of conception, and display true artistic feeling. A selection of them was published by M'Lean (accompanied by an illustrative description), in 304 sheets (Loud. 1830). An edition with Life and Times of Gillray, by T. Wright, was issued by Bohn (1851; new ed. 1873).

Gills, or Branchle, organs of aquatic respiration, consisting of expansions through the thin skin of which oxygen dissolved in the water is taken into the blood, while carbonic acid passes out. It is difficult to say what animal first exhibits gills; for respiration through the general skin is common in lower invertebrates, and the distinction between mere skin lobes and marked expansions in special connection with the vascular system is arbitrary. In startishes thin ont-pushings of the lining of the body-cavity project through pores in the skin; a modification of this simple plan is seen in some other Echinodermata; while the characteristic tube-feet are sometimes respiratory, and the Holothurians have often respiratory tentacles. In marine worms we find every transition from vague skin respiration to the increase of this by filaments or tentacles associated with legs or head,



Fig. 1.—Section of an Annelid Worm: br, gills; a, b, bload-vessels; i, intestine. (From Gegenbaur.)

and finally to definite gills. These are usually thin expansions, filamentons, tufted, or feathery, which project into the water, have eilia on their outer surface, and blood-vessels riddling them internally. In some of the lower Crustaceans again (Branchio-poda—i.e. 'gill-footed') a number of the legs are thin enough to admit of respiration through their surfaces, while the higher forms have associated with some of their limbs special tufts of respiratory filaments, or definite feathery gills, as in the lobster. These eonsist of a unin stem, within



Fig. 2.—Gills of Crayfish exposed (after Huxley).

which are two canals, one for the impure blood from the body, the other for the return of oxygenated blood on its way to the heart; but with these canals are connected numerous hollow, thinwalled filaments, in which the real respiration is effected. In the lobster and its allies these are overlapped by the sides of the anterior shield, but water currents are kept up by the baling action of one of the anterior appendages on each side. In the king-crab (Limulus), rather an Arachuid than a Crustacean, five pairs of abdominal appendages bear flat 'gill-books,' each of which consists of an axis bearing some 150 hollow, thin-walled, blood-containing leaves. In the aquatic larvae of some insects the air-tubes (tracher) are closed, but form gill-like outgrowths ('tracheal gills'), by means of which oxygen is absorbed. In bivalve molluses (Lamellibrauchs) the gills usually form ciliated plates on each side of the body. Each gill, or cteuidinm, as it is often called, really consists of two rows of hollow processes of the body-wall, extending downwards on each side of the foot, but each filament at its free end usually bends up again, so that a cross section has the form of a W, the median apex of which represents the point of origin from the hody-wall. Neighbouring filaments become linked to one another, and ascending and descending parts of the same filament are likewise crossed by bridges, so that finally continuous plates

result, channelled by bloodcontaining canals. Somewhat simpler on the whole are the external gill filamentof chiton, of the limpet, of nudibranchs, &c., or the in-

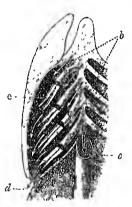


Fig. 4.— Dissection of the Pharynx of a Fish:
Showing by arrows, b, the course of the water; a, the gill arches; c, the gills; d, the external opening; e, the gullet.



Fig. 3.—Diagram of the Circulation of the Blood through the Gills: a,d, artery and branches; e,e, yein and branches.

ternal gills (covered by a folding of the mantle) in many aquatic Gasteropods; or lastly, the welldeveloped feather like gills in the mantle cavity of cuttle-fishes.

Among vertelrates gills are developed only as far as the amphibians, all of which have them in their youth, though many, such as the frog, have them entirely replaced by lungs in adult life. Beyond amphibians gills never occur, though branchial or visceral clefts on the sides of the pharynx remain as traces of the ancestral condition. In tunicates and in the lancelet water entering by the mouth washes the blood spread out in vessels between slits on the walls of the pharynx, but there are no gills. In the round mouths, or Cyclostomata, the gills are enclosed in pocket-like structures, through which the water passes. In fishes we have to distinguish transitory external gills occasionally present from true internal gill-filaments borne on the branchial arches

and washed as usual by the water which entering by the month passes ont by the gill-slits. The gill of a fish generally consists of two triangular folds of nuncous membrane, supported by the branchial arch and minor cartilaginous rods, and traversed,

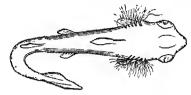


Fig. 5. Young Dog-fish, showing transitory external gills.

as the diagram suggests, by vessels with impure blood from the heart, and with oxygenated blood to the body (see Fishes). For Amphibia, see the case of the tadpole described in the article Froq, and the various adult states described in the article Amphibia. The student should examine especially the gills of bivalves—e.g. mussel—of fishes, and of tadpoles. See Circulation, Molluscs, Respiration.

For the general comparative anatomy of gills, see Professor F. Jeffrey Bell's Comparative Anatomy and Physiology (Lond. 1885), and other textbooks. For minnte structure of gills, see especially Holman Peck, Quart. Journ. Micr. Sci. xvii. (1877), and Professor Ray Lankester's article 'Mollnsca' in the Ency. Brit.

Gillyflower, a popular English name for some of the cruciferous plants most prized for the heauty and fragrance of their flowers, as wallflower in the west of England, stocks in other parts, &c.; also for Hesperis matronalis, Dame's Violet (q.v.). The clove-pink also, the wild original of the carnation, is called Clove-Gillyflower. The name gillyflower has been regarded as a corruption of Julyflower; but in Chancer it appears in the form gillefre; and the French girofle indicates the true derivation from girofle, a clove, the smell of the clove-gillyflower being somewhat like that of cloves.

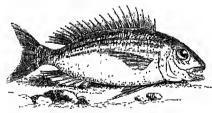
Gilolo, one of the Moluccas (q.v.) or Spice Islands.

Gilpin, Bernard, the 'Apostle of the North,' was born of an old Westmorland family, at Kentmire Hall, in 1517, studied at Queen's College, Oxford, and early showed unusual aptitude for learning. In 1552 he became vicar of Norton, in the diocese of Durham, but soon resigned the living to pursue his studies at Louvain. Returning to England towards the close of Mary's reign, he was appointed by his uncle Bishop Tunstall to be archdeacon of Durham and rector of Easington. Here his fearless honesty against pluralities and the indolence and viciousness of the clergy soon made him many enemies, whose charges of heresy Tunstall not only set aside, but, after Gilpin had resigned both his living and the archdeaconry, appointed him to be rector of Honghton-le-Spring. On the way to London, whither he had been summoned by Bonner, he accidentally broke his leg, and before he was able to resume his journey Elizabeth had succeeded Mary and he was safe. The see of Carlisle and the provostship of Queen's College, Oxford, were in turn offered him, but both he refused, preferring to spend the remainder of his life at Houghton in unceasing works of benevolence. His parish was wide, and sunk in the deepest ignorance, but he continually preached and exhorted in the pulpit and from house to house, settled the quarrels of his turbulent parishioners, set up a grammar-school, and praetised unbounded hospitality to strangers, to travellers, and to the poor, spending 'every fortnight 40 bushels of corn, 20

bushels of malt, and an ox, besides a proportional quantity of other kinds of provisions. Through Cecil he had obtained the rare distinction of a general license for preaching, and armed with this he regularly made preaching exemsions into the wildest parts of Cumberland, Westmorland, and Northumberland. His visits to the turbulent distincts of Tynedale and Redesdale he generally made about Christmas time, when it was easiest to gather the people together. The fearlessness of his temper is seen in the story of his taking down and putting into his bosom a glove which had been hung up as a challenge in a church in which he had to preach. His own naturally warm temper he held under complete control. His tall and slender person, his indifference to dress, and temperance in diet, added to his rare spiritual elevation of character, helped to make this singular man's influence over his people supreme. His last years were troubled with infirm health, from which he was relieved by death, 4th March 1583. There is a life of Gilpin written by Bishop Carleton, one of his pupils, in Bates's Vitte Selectorum aliquot Vironum (1681), a translation of which will be found in vol. iii. of C. Wordsworth's Ecclesiastical Biography. See also Collingwood's Memoirs of Bernard Gilpin (1884).

Gilpin, WILLIAM, was born at Carlisle in 1724. He was educated at Oxford, and kept a school at Cheam in Surrey, but was afterwards presented to the living of Boldre in Hampshire, where he died in 1804. His name is remembered for a series of books on the scenery of various parts of Britain illustrated by aquatint enganvings of his own execution. Of these the chief are Observations on Picturesque Beauty in several parts of Great Britain, particularly the Highlands of Scotland (1778); The River Wye and Southern Districts of Wales (1782); The Lack Country (1780); Forest Seenery (1791); and The Western Parts of England and Isle of Wight (1798).

Gilthead (Chrysophrys), a genus of 'seabreams' or Sparide, represented by about a score of species from the warmer seas, best known by the Mediterraueau species (Ch. aurata), sometimes found on the southern coasts of Euglaud. Large species oceur off the Cape of Good Hope, and Ch. husta is common on East Indian and Chinese coasts. The gilthead has an oblong and compressed body, a single dorsal fin with spines which can be received into a groove, scaly checks and gill-cover, and two kinds of teeth, sharp like canines in front, rounded like molars behind. The length is about a foot; the back is silvery gray,



Common Gilthead (Chrysophrys aurata).

shaded with blue; the belly like polished steel; the sides have golden bands; and there is a half-moon-shaped spot of gold between the eyes to which the various names Chrysophrys ('golden eye-brow'), Aurata ('gilded'), Daurade, and Gilthead obviously refer. They feed chiefly on molluses, in search of which they are said to stir up the sand with their tails. The fish is generally found near the shore in small shoals, and its presence is sometimes betrayed to fishermen by the noise which its teeth make in crushing shells. It was often kept

in the viraria by the Rowans, being much valued and easily fattened.

Gil Vicente, the father of the Portuguese drama, was born, probably at Lisbon, about 1470, and died, probably at Evora, shortly after 1536. He studied jurisprudence at the university of Lisbon, but soon abandoned this for dramatic poetry. His first piece, a pastoral drama in Spanish, was represented in 1502, to celebrate the birth of an heir to the throne. The success of this play led to his being employed on all similar occasions throughout the reigns of Emanuel and John III. He produced in all 42 pieces, of which 10 were in Spanish, 17 in Portuguese, and the remainder in both languages. They consist of religious dramas, counciles, and farees; are composed almost wholly in the medieval spirit; and contain several touches of poetic feeling, and in places are rich in humour. The first edition of his works was published in 1562. In 1834 a complete reprint was issued by Feio and Monteiro (3 vols. Hamb.).

Gimbals (Lat. gemellus, 'a twin') are two circular brass hoops used for suspending the compass-box on board ship, so that it may always rest horizontally, unaffected by the ship's motion. The onter hoop is attached to a box or other fixed object, while the inner is constructed so as to allow of its moving freely within the outer, to which it is attached by two pivots at the extremities of a diameter. The compass-box is attached to the inner hoop by two similar pivots at right angles to the former. Thus the compass moves freely in two directions at right angles to each other, and can always retain its horizontal position, however the vessel may roll or pitch. Gimbals are also applied to other instruments.

Ginp, or GYMP, a kind of trimming for dress, curtains, furniture, &e., unade either of silk, wool, or cotton. Its peculiarity is that line wire is twisted into the thin cord of which it is made. Gold and silver are used in the manufacture of military gimps.

Gin, or Geneva, an alcoholie drink, distilled from malt or from unmalted barley or other grain, and afterwards rectified and flavoured. The gin which forms the common spirituous drink of the lower classes of London and its vicinity is flavoured very slightly with oil of turpentine and common salt. Each rectifier has his own particular recipe for regulating the quantities to be used, but usually about 5 fluid ounces of spirit of turpentine and 3½ lb. of salt are mixed in 10 gallons of water; these are placed in the rectifying still, with 80 gallons of proof corn-spirit, and distilled until the feints begin to come over. The product is then used either unsweetened or sweetened with sugar. Potato spirit is used in the manufacture of inferior analities of gin.

qualities of gin.

The word gin is a shortened form of geneva, so called by confusion with the Swiss town of Geneva, but itself really a corrupted form of the Old Fr. genevre, 'juniper,' from the Lat. juniperus. It is well known that juniper-berries are still used in flavouring the spirit made from rye-meal and malt in Holland, where it is an article of great manufacture, chiefly at Schiedam; hence it is often called Schiedam or Hollands, as well as geneva and gin. The larger part by far of the spirit made in Holland is exported to other countries, especially to North America and northern Enrope. It was formerly always exported in bottles, a square form of which is still familiar, but casks are now much used as well.

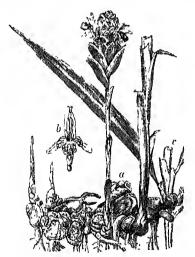
Almost every gin-palace keeper in London has some vile recipe for increasing the pungency and giving a factitions strength to the much-diluted sweetened spirit sold under this name. A mere

enumeration of the articles usually employed will give some idea of the extent to which sophistication is carried on with this spirit: roach alum, salt of tartar (carbonate of potash), oils of juniper, cussia, nutneg, lemons, sweet fennel, and caraway, coriander seeds, cardamons, and capsicians, and, it is alleged, even sulphuric acid. Excess of turpentine is the most common and perhaps the worst adulterant. Still much sound gin is made in London—the diuretic qualities of its 'Old Tom,' as well as of Hollands, are well known.

Ginckell, Godart Van, Dutch general, born at Utrecht in 1630 or 1640, accompanied William III. to England in 1688. Along with his master he crossed over to Ireland in 1690, and commanded a body of horse at the battle of the Boyne. On the king's return, Ginckell was left as commander-inchief in Ireland. He therenpon reduced Ballymore and Athlone, defeated St Ruth at Aghrim, and finally captured Limerick. For this he was in 1692 created Earl of Athlone. He afterwards commanded the Dutch troops under Marlborough in the Low Countries. He died at Utrecht, 10th February 1703.

Gingal, a large, clumsy musket used by Asiatic armies in the defence of fortresses, and sometimes mounted on carriages as a light field-gun.

Ginger (Zingiber), a genus of Zingiberaceæ, of which most species yield root-stocks useful as condiments and stomachies, especially the narrow-leaved or common ainger (Z. officinale), which has been cultivated in the East Indies from time immemorial, and is now also cultivated in other tropical countries, particularly the West Indies and Sierra Leone, from both of which, as well as from the East Indies, its root-stocks—the ginger of commerce—arc a considerable article of export. The cultivation is extremely easy, and is carried on up to 4-5000 feet



Common Ginger (Zingiber officinale):
a, plant with barren and flowering stems; b, a flower;
c, portion of leafy stem. (From Bentley and Trimen.)

in the Himalayas in moist situations. The root-stock is taken up when the stems have withered, and is prepared for the market either simply by scalding in boiling water—in order to kill it—and subsequent drying, or by scraping and washing. The first method yields Black Ginger, the second White Ginger; but there are considerable varietal differences in the shades of these. The blackest of Black Ginger, moreover, is only of a stone colour, and the whitest of White Ginger very far from

perfectly white, unless bleaching by chloride of lime be afterwards employed to improve its appearance—a process not oflierwise advantageous. uses of ginger, both in medicine as a stimulant and carminative, and in domestic economy as a condiment, are too well known to require particular notice. It contains a good deal of starch, but its main qualities depend upon its pale yellow volatile oil. Preserved Ginger, largely imported from China and the East and West Indies, consists of the young root-stocks preserved in syrup: it is not only a delicious sweetmeat, but a useful stomachic. The young root-stocks are often also candied.— Pliny to have been brought from Arabia.—Zenumbet (Z. zerumbet), also called Broad-caved Ginger (and sometimes erroneously Round Zedoary), is cultivated in Java; its root-stock is much thicker, but less pungent.—Cassumunar (Z. cassumunar), sometimes called Yellow Zedoary, has a camphor-like smell, and a bitter aromatic taste. It was of high reputation as a medicine about the close of the 17th century.—Mioga (Z. mioga) is less pungent than ginger, and is used in Japan.—Cattle sent to graze in the jungles of northern India, during the rainy season, are supplied with the root-stocks of Z. capitation, to preserve their health.—The root of Aristolochiu (q.v.) canadense, sometimes called Indian Ginger or Wild Ginger in North America, is applied to similar uses.

Essence of Ginger, much used for flavouring, is merely an alcoholic tincture,—Syrup of Ginger is used chiefly by druggists for flavouring,—Ginger is used chiefly by druggists for flavouring,—Ginger is a domestic remedy very useful in cases of flatulence, and is an infusion of ginger in boiling water.—Ginger-beer is an efferveseing drink made by fermenting ginger, sugar, and some other ingredients, and bottling before the fermentation is completed.—Ginger Wine or Ginger Cordial is a liqueur flavoured with ginger.—Ginger Alc is one of the Aerated Waters (q.v.).—Gingerbread is a very well-known article of food, which in the 14th century was made of rye dough, kneaded with ginger and other spice, and honey or sugar. Now its constituents are treacle, moist sugar, wheaten-flour, butter, and eggs, flavoured with ginger and other spices; a little carbonate of ammonia, are sometimes put in to

give lightness.

Gingham (Fr. guingan: according to Littré, a corruption of the name of the town of Gningamp), a cotton fabric manufactured chiefly for dresses. It is of a light or medium weight, and is woven from colonned yarns into stripes or checks; but the patterns, while preserving this general character, are endlessly varied both as to figure and colonr. These being produced by weaving, the fabric differs from printed calico, some of the patterns on which resemble those of ginghams. Genuine Earlston ginghams still command a high price owing to their excellent quality, but they are now only made to a very limited extent, Glasgow and Manchester being the centres where this kind of goods is manufactured on a large scale. Cotton stuffs sold under other names, such as zephyrs and chambreys, partake of the nature of ginghams.

Gingile Oil, a name often given to the bland fixed oil obtained by expression from the seeds of Sesamum Indicum. See SESAMUM.

Gingko (Gingko biloba, or Salisburia adiantifolia) is the Japanese name of a coniferous tree of the yew alliance (Taxacere), with very characteristic leaves, in form and variation recalling the leaflets of the maiden-hair ferns. The yellow drupelike seeds reach the size of a walnut, and are largely eaten throughout (Thina and Japan; the chestnut-like kernels are roasted like chestnuts, and also

yield a wholesome oil. The Japanese esteemed the tree as sacred, and planted it round their temples. Being a free-grower, and having been introduced in the 18th century, large trees are now not uncommon in Europe, nor in America, where they were introduced in 1784. The tree is dioceous, but the Chinese sometimes plant several male and female trees close together, so that male and female flowers appear to arise on the same tree.

Ginkell. See GINCKELL

Ginseng, a root highly esteemed in China as a medicine, being universally regarded as possessing the most extraordinary virtues, and as a remedy for almost all diseases, but particularly for exhanstion of hody or mind. It is the root of a species of Panax (order Araliaceae), appropriately so called since so typical a panacea. P. Ginseng of Chinese Tartary is, however, searcely distinct from P. quinquefolium of North America, which is exported to China to the amount of about 500,000 lb. annually, but fetches a lower price. The ginseng of Corea is most valued, and is carefully cultivated in that country. It is raised from seed; the seedlings are planted out, and frequently transplanted, and it is not till the fifth year that the plant reaches maturity. Ordinary ginseng is prepared by simply drying the root over a charcoal fire; the red or clarified ginseng is steamed in earthenware vessels with holes. The root is mucilaginous, sweetish, also slightly bitter and aromatic. It has been regarded as a very clixir of life all over the East, but especially in China and Japan. Western medical practitioners, however, have as yet failed to confirm or explain its extraordinary reputation among the Chinese. The export from Corea, amounting to 27,000 lb. in a good year, is a strict monopoly. The wild ginseng of Corea has frequently fetched twenty times its weight in silver in China. P. fruticosus and cochleatus of the Molnecas are fragrant aromatics used in Indian native medicine.

Gioberti, Vincenzo, an Italian philosopher and political writer, was born 5th April 1801, at Turin. Educated for the church, he was ordained to the priesthood in 1825, and on the accession of Charles Albert to the throne of Sardinia was selected as chaplain to the court. But, his liberal views being obnoxious to the elerical party, he was two years later suddenly arrested, and after four months' imprisonment sent out of the country. After a short stay at Paris, the exile went on (1834) to Brussels, where he spent eleven years as private tutor in an academy, pursning in his leisure hours his favourite studies. These were at first of a philosophic nature, the fruits of his labours appearing in Introduzione allo Studio della Filosofia (1839), Del Bello (1841), and Del Buono (1842). Towards the end of his period of exile in Brussels he began to write on the state of Italy. A devont Catholic, Gioberti looked upon the papacy as the divinely appointed agency for the elevation of Italy among the nations. A confederation of states subject to papal arbitra-tion, and having in the king of Sardinia a military protector, was the scheme he devised for the unity and regeneration of his country. These views he elaborately developed in Del Primato Civile e Morale degli Italiani. Its publication in Paris in 1843 was hailed with the utmost enthusiasm in Italy, and his fame was still further enhanced by his work II Gesuita Moderno (1846-47), directed against the Jesuit order. On his return to Italy in 1848 he was received with universal ovations from all classes of the people, was chosen by both Turin and Genoa as their representative in parliament, was appointed senator by the king, and subsequently elected president of the chamber of deputies, and finally prime minister. As a statesman, however,

he was not successful, and after a few weeks' tenure of office he resigned. Being shortly afterwards despatched to Paris on a political mission, he finally settled there and devoted himself exclusively to literary pursuits. He died at Paris of apoplexy, 26th October 1852. His chief writings besides those mentioned are Teorica del Sopranuaturale (1838), a work against what he regarded as the philosophical errors of his countryman Rosmini (1842), Del Rinnorumento Civile d'Italia (1851), La Filosofia della Rivelazione (1856), and Della Protologia (1857). In philosophy he stood somewhat apart from most schools, though cherishing Platonic sympathies; his works, though Christian and religiously orthodox, were placed on the Index. In 1856–63 Massari published in 11 vols. the Opere Incedite of Gioberti. See Massari, Vita di Gioberti (1848); Spaventa, La Filosofia di Gioberti (1864); and Berti, Gioberti (1881).

Gioja del Colle, a town of Italy, 33 miles by rail S. of Bari, has a trade in corn, wine, and oil, and 16,573 inhabitants.

Giordano, Luca, an Italian painter, was born at Naples, about 1632, studied under Ribera in that town, and afterwards under Cortona at Rome. Subsequently he visited the pincipal centres of painting in Italy. Giordano acquired the power of working with extreme rapidity (whence his nickname Fa-Presto, 'Make-haste'), and of imitating the style of most of the great masters. Consequently much of his work is lurried and superficial. In 1692 he proceeded to Madrid, at the request of Charles II. of Spain, who desired his assistance in the embellishment of the Escorial. On the death of Charles in 1700 Giordano returned to Naples, where he died, 12th Jannary 1705. His linest frescoes are to be found in the Treasury of the Certosa, near Pavia, and in the church of San Lorenzo, in the Escorial; his best pictures are 'Christ expelling the Traders' and 'Francis Xavier' (Naples), a Nativity (Madrid), the 'Judgment of Paris' (Berlin), and several in the gallery at Dresden.

Giorgione (i.e. 'Great George'), the name conferred, by reason of his stature and his artistic eminence, on Giorgio Barbarella, who was born about 1477, near Castelfranco, in the Venctian province of Trevisno, the illegitimate son, as it is believed, of a member of the Barbarella family by a peasant girl of Vedelago. At an carly age he came to Venice, and studied painting under Giovanni Bellini, where Titian was his fellow-pupil. He soon attained fame as a painter, developing a manner freer and larger in handling and design than that of his master, and characterised by intense poetic feeling, by great beauty and richness of colouring, and by a constant reference to nature, as is very visible in the landscape backgrounds of his figure-pieces, in which he introduced the scenery that surrounded his birthplace. While still young he executed portraits of Gonzalvo of Cordova, of the Doges Agostino Barbarigo and Leonardo Loredano, and of Queen Cornaro of Cyprus, who then resided at Asolo, not far from Castelfranco; but these works have disappeared. One of the earliest of his productions that have survived is an 'Enthroned Madonna with SS. Francis and Liberale,' an altarpiece commissioned, probably in 1504, by Tuzio Costanzo for the church of Castelfranco—where Giorgione also executed frescoes. These latter perished when the edifice was destroyed, but the altarpiece is still preserved in the new church. It has been reproduced by the Arundel Society, and the oil study for its figure of S. Liberale is in the National Gallery, London. In Venice also Giorgione was extensively employed in resco-painting, decorating in this manner the exterior of his own house in the Campo di San

Silvestro, of the Soranzo Palace, of the palace of Andrea Loredano, of the Casa Flangini, and, along with Titian, of the Fondaco de' Tedeschi when it was rebuilt in 1506. Some fragments of the last-named frescoes are all that now remains of his work of this nature. The crities are much divided as to the easel-pictures which may be correctly attributed to Giorgione, and the best authorities reject by far the greater number that bear his name in the various public galleries. The picture known as 'The Family of Giorgione,' in the collection of the late Prince Giovanelli at Venice; that titled 'The Three Philosophers,' in the Belvedere, Vienna; and the 'Sleeping Venus,' in the Dresden Gallery, are admittedly genuine: but we can no longer regard as undoubtedly from his brush even such noble compositions as the 'Concert' of the Pitti which seems to embody the very spirit of music, an art to which, as we learn from Vasari, the painter was devoted, his skill as a singer and lute-player having procured his admission into the most distinguished circles of Italian society. The former is now attributed by Crowe and Cavaleaselle to the school of Del Piombo, and the latter—which these authorities esteem one of the greatest of the master's pictures—is regarded by Morelli as 'for certain not a work of Giorgione,' but probably an early and much repainted production of Titian. Giorgione died at Venice in 1511, in his thirty-fourth year. He ranks with the very greatest of Venetian painters, and his example powerfully influenced such of his contemporaries as Schastian del Piombo, Pordenone, and even Titian himself.

Giotto di Bondone, one of the greatest of the early Italian painters, and also celebrated as an architect, was born probably in 1266, though Vasari gives the year as 1276, at the village of Vespignano, 14 miles from Florence. At the age of ten he was discovered by Cinabue, tending his father's flocks, and drawing one of the lambs upon a flat stone, and was by him taken to Florence and instructed in art. The master was then at the height of his fame; he had infused new life into the old Byzantine forms which were entrent in the art of the time, introducing more of nature, and greater variety and truth of form and expression; and the changes which he inaugurated were, with far greater power, earried towards perfection by his gifted pupil, who introduced a close imitation of nature, a vivid and dramatic realisation of subject, more satisfying and varied composition, a broader distribution of masses, and greater lightness of colonring. The first of Giotto's independent works, such as those which Vasari states that he executed in the Badia of Florence, have perished; and the earliest that have been preserved are a series of twenty-eight frescoes, seems from the life of St Francis, in the aisle of the Upper Clurrch at Assisi. The 'St Francis in Glory,' and the noble allegorical subjects of 'Poverty,' 'Chastity,' and 'Obedience,' on the ceilings of the Lower Church, mark the increasing strength of the painter. They are assigned by Crowe and Cavaleaselle to the year 1296, though probably they are the work of a later period. Two years afterwards he was employed in Rome by the Cardinal Stefaneschi, designing among other works the mosaic of the 'Navicella,' which, interly restored, may still be seen in the vestibule of St Peter's. In 1300-2 we trace him at work in Florence, taking part in the execution of a series of frescoes—a 'Paradise,' an 'Inferno,' and scenes from the life of Saints Magdalen and Mary of Egypt, in the Bargello (now the Museo Nazionale). In the 'Paradise' he introduced portaits of Brunetti Latini, Cors

whose acquaintance he had made in Rome, and who refers to the painter in canto xi. of the Purgatorio. These works were long concealed by whitewash, which was removed in the 19th century. The head of Dante has been repainted in an incorrect and misleading manner; but an accurate tracing had previously been made by Mr Seymonr Kirkup, and this has been reproduced by the Armidel Society.

previously been made by Mr Seymour Kirkup, and this has been reproduced by the Arundel Society. The next great series of works by Giotto is the frescoes in the Annunziata dell' Arena Chapel, founded by Enrico Scrovegni at Padna. Here we find the artist rising to his highest power, and realising the scenes of sacred history and legend with a directness and an intensity such as had not hitherto appeared in Italian art. The frescoes comprise thirty-eight subjects from the lives of the Virgin and Christ, as related in the lives of the Virgin and Christ, as related in the apocryphal and canonical gospels, a 'Christ in Glory,' a 'Last Judgment,' and a series of fourteen single figures personifying the cardinal virtues and their opponent vices. In 1306, during the progress of these works, Dante, then in exile, visited Giotto at Padua, and it has been believed that the treatment of the symbolical subjects, which are executed with extreme care, doubtless entirely by the ented with extreme care, doubtless entirely by the master's own hand, embodies suggestions received from the great poet. Engravings of the Arena Chapel freecoes, with valuable letterpress by Mr Ruskin, have been published by the Arundel Society. No traces survive of the works which, according to Vasari, Giotto afterwards executed in Verona and Ferrara; but the frescoes with which, after 1307, he decorated the Peruzzi and Bardi Chapel in the church of Santa Croce, Florence, have been disclosed by the removal of the whitewash which concealed them for nearly two eenturies, and which still covers his works in the Gingni and the Tosinghi and Spinelli Chapels in the same clurch. The Peruzzi frescoes, seenes from the lives of St John the Bantist and St John the Evangelist, mark the culminating point John the Evangelist, mark the culminating point of the painter's genius—they are masterpieces which 'clear contemporary admirers from the charge of exaggerated admiration and unwarranted flattery,' and 'justify all that has been said respecting the grandeur of his style.' The noble 'Coronation of the Virgin,' in tempera upon panel, in the Baroneelli Chapel of Santa Croce, is another work of about the same period. From 1330 to 1333 Giotto was employed in Naples by King Robert. Here he exercised a powerful influence upon artistic production, but only one In the seven Sacraments' in the Chapel of the Incoronata being now attributed to an unknown follower of the painter. In 1334 he was appointed master of works of the cathedral and city of Florence. Aided by Andrea Pisano he decorated the façade of the cathedral with statues, and designed the exquisite isolated Campanile (q.v.) and the vivid bas-reliefs which adorn its base. This tower was completed after his death, at Florence, 8th January 1336.

The personal anecdotes of Giotto that have been preserved by Boccaccio, Sacchetti, and other writers, show him to have been a shrewd homely personage, with an excellent sense of humour, and a ready power of repartec. Vasari tells the often-quoted story of 'the O of Giotto'—how when the pope sent a messenger to ask the painter for a specimen of his art in view of a proposed commission, 'Giotto, who was very comrteous, took a sheet of paper and a pencil dipped in red colour, then resting his elbow on his side, to form a sort of compass, with one turn of his hand he drew a circle so perfect and exact that it was a marvel to behold,' and handed this to the courtier as a sufficient

proof of his technical skill. In spite of some discrepancies of detail there appears to be a basis of truth in the story, which has originated the Italian phrase, 'As round as Giotto's O'. See H. Quilter's Giotto (Lond. 1880).

Giovinazzo, an Italian town on the shore of the Adriatic, 14 miles WNW. of Bari by rail. It is an episcopal seat. Pop. 9797.

Gippsland, one of the four important districts into which Victoria, Australia, is divided, is so named after an early governor. It forms the southeast portion of Victoria, and has an area of 13,898 sq. ni. Its length from west to east is 250 miles, and mean breadth about 80. It was originally called Caledonia Australis by Mr Macmillan, its first explorer (1839). Pop. (1881) 30,856.

Gipsies. See Gypsies.

Gipsies. See Gypsies.

Giraffe, or Camelopard (Camelopardalis Giraffa; giraffa, the Spanish name, being derived from the Arabic zaraff, and that, apparently, from the Egyptian soraphé, 'long neck'), the tallest of quadrupeds, ranked by some naturalists among deer (Cervide), but more properly regarded as constituting a distinct family of ruminants, which contains, however, only one species. It is a native of Africa, south of the Sahara. It occurs generally in small heids of from five to forty. It feeds on the leaves and small branches of trees. Its general aspect is remarkable from the height of the foreparts and great elongation of the neck, the head being sometimes 18 feet tion of the neck, the head being sometimes 18 feet from the ground. The number of vertebre in the neck, however (seven), is not greater than in other quadrupeds, and it has no extraordinary flexibility, although its form and movements are very graceful. The hody is short, and the back slopes from the shoulder to the tail; yet the greater height of the foreparts is not entirely owing to the greater length of the fore-legs, but to the neural processes of the vertebrae, which form a basis for the support of the neck and head. The articulation of the skull to



Giraffe (Camelopardalis Giraffa).

the neck is such that the head can be easily thrown back until it is in the same line with the neck, thus giving the annual additional power of reaching its appropriate food. The skull has empty cavities, which give lightness to the head, along with sufficient extent of surface for the insertion of the ligament which supports it. The legs are long and slender; the feet have cloven hoofs, but are destitute of the small lateral toes or spurious hoofs which occur in other runninants. The head is long;

the upper lip entire, projecting far beyond the nostrik, and endowed with considerable muscular power. The tongue is remarkably capable of elongation, and is an organ of touch and of prehension, like the trunk of an elephant; it can be thrust far out of the mouth, and employed to grasp and take up even very small objects; it is said that its tip can be so tapered as to enter the ring of a very small key. The usefulness of such an organ for drawing in leaves and branchlets to the month is obvious. The giraffe adroitly picks off the leaves of acacias and other thorny plants, without taking the thorns into its month. The dentition of the graffe agrees with that of antelopes, sleep, goats, and oxen; the upper jaw of the male is destitute of the canine teeth which are present in the male

of most kinds of deer.

The head is furnished with two remarkable protuberances between the ears, generally described as horns, but very different from the horns of other animals, and each consisting of a bane united to the skull by an obvious suture, a bone united to the skill by an obvious sature, permanent, covered with skin and hair, and terminated by long hard bristles. These long ontgrowths may correspond to the long core of the antler in the deer. There is also a projection on the forehead. The ears are moderately long; the tail is long, and terminates in a taff of long hair. There is a callosity on the breast. The neck has a very short mane. The taft of long hair. There is a callosity on the breast. The neck has a very short mane. The hair is short and smooth; the colour is a reddishwhite, marked by numerous dark rinsty spots. Its nostrils have a muscle by which they can be closed; a provision, as Owen supposes, for excluding particles of sand. It is an inoffensive animal. and generally seeks safety, if possible, in flight, although it is capable of making a stout resistance, and is said to beat off the lion. It fights by kicking with its hind-legs, discharging a storm of kicks with extraordinary rapidity. It is not easily overtaken even by a fleet horse, and has greatly the advantage of a horse on uneven and broken ground. Its pace is described as an amble, the legs of the same side moving at the same time. The gradie was known to the ancients, and was oshihited in Roman speciacles. Representations of it appear among Egyptian antiquities. It has been supposed to be the zemer of the Jews, translated channels in the English Bible (Dent. xiv. 5). In the year 1836 giraffes were first added to the collection in the gardens of the Zoological Society of London, and since that year numerous specimens that been acquired which have bred in the gardens. They are fed chiefly on hay placed in high racks, greatly enjoy carrots and onions, and a lump of sugar is a favourite delicacy. The flesh of the giruffe is said to be pleasant, and its marrow is a favourite African delicacy.

Giraldus Cambrensis, the usual literary name of the historian and ecclesiastic, Girald de Barri, who flourished in the 12th and 13th centuries, and was horn about 1147 in Pembrakeshire, son of and was norn about 1147 in Pembrokeshire, son of a Norman noble who had married into a princely Welsh family. He was brought up by his uncle, the Bishop of St Davids, was sent to the university of Paris in his twentieth year, and after his return entered into holy orders in 1172, and was appointed archdeacon of St Davids. He was from the first a zealous churchman, streamons in the enforcement of discipline, and especially of clarical collings, and of discipline, and especially of clerical eclibacy, and was the chief agent in establishing the payment of tithes within the principality. On the death of his uncle, the chapter of St Davids elected him bishop, but, as the election was made without the royal license, Girald renounced it. King Henry II. directed a new election; and, on the chapter's persisting in their choice of Girald, the king refused

to confirm the selection, and another bishop was appointed. Girald withdrew for a time to the university of Paris, and on his return was required by the Archbishop of Canterbury to take the administration of the diocese of St Davids, which had atterly failed in the hands of the hishop. He held it for four years. Being appointed a royal chaplain, and afterwards preceptor to Prince John, he accompanied that prince in 1185 in his expedi-tion to Ireland, where he remained after John's return, in order to complete the well-known descriptive account of the natural history, the miraeles, and the inhabitants of that country—his Topo-graphia Hiberniae. His Expugnatio Hiberniae is an account of the conquest of that country under Henry II. Both are works of very great merit— this latter Brewer describes as 'a noble specimen of historical narration, of which the author's age furnished very rare examples.' In 1188 he attended Baldwin, Archbishop of Cauterbury, in his progress through Wales to preach a crusade, and worked up his observations into the Itinerarium Cumbrice. His later years were darkened by disappointment. On the see of St Davids again becoming yacant, he was again unanimously elected by the chapter; but Archbishop Hubert of Canterbury interposed, and Girald, spite of three different journeys to Rome, failed to get the nomination confirmed. He devoted the remainder of his life to study, and died at St Davids in 1222. The writings of Giraldus Cambrensis, although disfigured by credulity and by excessive personal vanity, are of great value as materials for the history and for the social condition of his age. A translation of the History and Franchism (Londwig was published in 1806) the *Itinerarium Cambrice* was published in 1806 (2 vols.); the complete works have been edited by I. S. Brewer and J. F. Dinock (7 vols., Rolls series, 1861-77).

Girard, Stephen, miser and philanthropist, was born near Bordeaux, 24th May 1750, and was successively cabin-boy, mate, captain, and part owner of an American coasting vessel. In 1769 he settled as a trader in Philadelphia, where ultimately he established a bank which became the mainstay of the United States government during the war of 1812-14, and advanced several millions to the treasury. He died 26th December 1831, leaving a large fortune to charities. Girard was a man of few friends, crabbed and unapproachable, in religion a sceptic, in personal habits a miser, as a master exacting and hard, as a debtor not unwilling to escape payment where a legal technicality enabled him to avoid a just claim. Yet in the yellow fever epidemic in 1793 he nursed many of the sick in the hospitals; and in public matters his generosity was remarkable. Among other bequests he left \$2,000,000 for the erection and maintenance in Philadelphia of a college for male white orphans; no minister of any sect whatever was to be on its board, or even to enter the premises as a visitor. The principal building (1833-47) is in the form of a magnificent Greek temple with Corinthian columns; thore were 1134 pupils in 1886.

Girardin, Émile de, a French journalist and politician, the illegitimate son of the royalist general Alexandre de Girardin and Madame Dupny, was born in Switzerland in 1806, and educated in Paris. He bore the name of Delamothe until 1827, when he assumed that of his father, who acknowledged him in 1847; and his first attempt in literature was a novel, Émile, in which he pleaded the cause of adulterine children. After the July revolution (1830) he established the Journal des Connaissances Utiles, which attained a sale of 120,000 eopies; other cheap magazines followed, but he did not carry out his idea of a halfpenny newspaper until 1836, when he founded the Presse, an Orleanist journal with

Conservative leaning. Its rivals accused it of being subsidised by the government, and one of the unfortunate results of the quarrels thus fastened on Girardin was his duel with Armand Carrel, editor of the National, in which the latter fell. From this time onward to the Revolution of 1848 Girardin was ardently occupied with politics, both as a journalist and a deputy, and gradually became a decided republican. He promoted Louis Napoleon's election to the presidency, but disapproved of the coup d'état, and was rewarded with a short period of exile. He next threw himself into the arms of the Socialists. In 1856 he sold his share of the Presse, but became its editor again in 1862, eventually abandoning it for the direction of the Liberté, which he maintained till 1870. He excelled his fellows in braggadocio on the outbreak of the France-Prussian war; and during the Commune he proposed a scheme for splitting up the republic into fifteen federal states. In 1874, however, he founded the France, and both in its pages and in the Petit Journal supported the republic. He wrote a few pieces for the stage; his political ideas he gave to the world in a host of brochures. Girardin died 27th April 1881.—His first wife, whose maiden name was Delphine Cay (1803-55), enjoyed for many years a brilliant reputation as a poetess and beauty, and also wrote several novels and plays. Her best-known work is Lettres Parisienes, which appeared in the Presse, under the pseudonym of Viconte de Lannay, in 1836-48. Her complete works fill 6 vols. (1800-61). See Imbert de Saint-Amand, Madame de Girardin (Paris, 1874).

Grardin, François Saint-Marc, a French journalist and professor, was born at Paris in 1801, studied at the Collège Heuri IV. with brilliant success, and in 1827 obtained a mastership in the Collège Louis-le-Grand. After two visits to Germany he published a report on the state of education there, and Notices politiques et littéraires sur l'Allemagne; in 1834 he was called to the chair of Literature at the Sorbonne, and became leader-writer for the Journal des Débuts, distinguishing himself under the July monarchy as a ready combatant and resolute enemy to the dynastic and democratic opposition. He was elected a member of the Academy in 1844. His parliamentary carcer (1834-48) was not noteworthy; and under the Second Empire he retained his chair at the Sorbonne, where his lectures, following the orthodox lines of criticism, were very popular. He became a member of the National Assembly in 1871, and died near Paris, 11th April 1873. Besides his numerous contributions to the Débats, some collected in Essais de Littérature (2 vols. 1845), he published several large works, among them his Cours de Littérature dramatique (1843; 11th ed. 1875-77), being his sixty-three lectures for a period of twenty years, and Souvenirs et Réflexions politiques d'un Journaliste (1859). See Tamisier, Saint-Mare Girardin, Etude littéraire (1876).

Girasol, a precious stone, exhibiting in strong lights a peculiar and beautiful reflection of bright red or yellow light, which seems to come from the interior of the stone. From this it derives its name (Ital., 'sun-turning'). There are different kinds of girasol, variously referred by mineralogists to quartz and opal, species which, however, are very nearly allied. One kind is also known as Fire Opal, which is found only at Ziunapan, in Mexico, and in the Farce Islands. The Mexican specimens are of a rich topaz yellow colour, and the reflection is very bright. Another kind is the Quartz Resinite of Haüy, so called because of its characteristic resinous fracture. It is found of various colours, sometimes of a fine yellow or emerald green, more

generally bluish-white. For a specimen of extraordinary brilliancy, not an inch and a half in diameter, £1000 has been refused. The ancients held this stone in high estimation, and called it Asteria (Gr. aster, 'a star'). They obtained it both from Caramania and from India. The brightest are at present brought from Brazil, but fine specimens are also obtained in Siberia. Imitation girasols are made of glass in which a little oxide of tin is mixed.—The name girasol is sometimes given to a kind of sapphire, also called Asteria sapphire, exhibiting a similar reflection of light, and sometimes to Sunstone, an avanturine felspar. According to Castellani, many minerals can be made to reflect light from the interior in the same way as girasol, when they are carefully cut in a spherical or semi-spherical form. He instances adularia, hydrophane (a variety of opal), milky cornadum, some kinds of chalcedomy, Bazilian chrysolite, &c.

Girder, a beam of wood, iron, or steel used to support joisting walls, arches, &c., in building various kinds of bridges. See BRIDGE; STRENGTH OF MATERIALS.

Girgch, a town of Egypt, is situated on the left bank of the Nile, in 26° 20′ N. lat. and 31° 58′ E. long., 10½ miles N. of the ancient Abydns. The town is being gradually undermined by the river. It was here that the discontented Mamelukes rallied against Mehemet Ahi. Outside the town is a Roman ('atholic monastery, said to be the oldest in Egypt. Pop. (1882) 14,819. Girgeh is the capital of a province of the same name, which has an area of 9202 sq. m., and a pop. (1882) of 521,413.

Girgenti, a town of Sicily, built on an eminence overlooking the sea, near the site of the ancient Agrigentum (q.v.), and situated on the south coast, 84 miles by rail SSE of Palermo. The town is the scat of a hishop and of the prefect and other officials of the province, and has a trade in grain, oil, fruit, sulplum, sunnaeh, salt, and lish. Its portis Porto Empedoele. Pop. (1881) 19,380.

Girnar, a sacred mountain in India, stands in the peninsula of Kathiawar, Bombay province, 10 miles E. of Junagarh. It is a bare and black rock of granite rising to the height of 3500 feet above the sea; and, as a holy place of Tainism, is covered with ruined temples. One group contains sixteen temples, nearly 3000 feet above the sea.

Gironde, a maritime department in the southwest of France, is formed out of part of the old province of Guienne. Area, 3760 sq. m.; pop. (1872) 705,149; (1886) 775,845. It is watered mainly by the Garonne and the Dordogne, and by the Gironde, the estuary formed by the union of these two rivers. The eastern two-thirds of the surface consist of a fertile hill and dale region; the remainder, in the west next the ocean, belongs to the Landes (q.v.). In the east and north-east the soil is chiefly calcareous. Wine, including the finest clarety, is the staple product of the department, several million gallous being produced annually. Grain, vegetables, potatocs, pulse, and fruit are grown largely. On the downs or sand-hills of the west coast there are extensive plantations of pine, from which turpentine, pitch, and charcoal are obtained. The shephords used to traverse the Landes (q.v.) on high stilts, and travel with them also to markets and fairs. Principal mannfactures, salt, sugar, wax candles, porcelain and glass, chemical products, paper, and tobacco. The department includes the six arrondissements of Bazas, Blaye, Bordeaux, Lesparre, Libonrue, and Réole. Bordeaux is the capital.

Girondists (Fr. Girondins), the moderate republican party during the French Revolution.

From the first they formed the Left in the Legislative Assembly, which met in October 1791, and though inclined towards republicanism were yet devoted to the new constitution as it stood. The name was due to the fact that its earliest leaders. Vergniaud, Guadet, Gensonné, Grangeneuve, and the young merchant, Dacos, were sent up as representatives by the Gironde department. Early in 1792 the reactionary policy of the court and the dark clouds lowering on the horizon of France made the king's ministers so unpopular that Louis was fain to form a Girondist ministry, with Roland and Dunnomiez as its chiefs. Ere long, however, they were dismissed—a measure which led to the insurrection of the 20th June 1792. The advance of the Anstrian and Prussian invaders threw the influence anstrian and Finsian in the state of the hands of the Jacobins, who alone possessed victor enough to 'save the revolution.' The great vigour enough to 'save the revolution.' The great emeute of the 10th August finally assured their trimuph, which vented itself in such infamics as the September massacres. Next followed the National Convention and the trial of the king. The Girondists tried to save the king's life by appealing to the sovereign people. The fall of appearing to the sovereign people. The lan of Roland and the ascendency of Robespierre followed. Dimouricz, to save his head, rode over into the Austrian camp, and the famous Committee of Public Safety was created. Of its members not one was a Grondist. The last effort of the party was an ineffectual attempt to impeach Marat, who, however, on the 2d July overthrew the party, arresting as many as thirty one deputies. The majority had already escaped to the provinces. In the departments of Enre, Calvados, all through Brittany, and at Bordeaux and elsewhere in the south-west the people roso in their defence, but the movement was soon crushed by the irre-istille energy of the Mountain, now triumphant in the Convention.

On the 1st October 1793 the prisoners were accused before the Convention of conspiring against the republic with Louis XVI., the royalists, the Duke of Orleans, Lafayette, and Pitt, and it was deereed that they should be brought before the Revolutionary Tribunal. On the 24th their trial commenced. The accusers were such men as Chabot, Hébert, and Fabre d'Eglantine. The Girondists defended themselves so ably that the Convention on the 30th was obliged to decree the closing of the investigation. That very night, Brissot, Vergniaud, Gensonné, Ducos, Fonfrede, Lacaze, Lasource, Valazé, Sillery, Fauchet, Duperret, Carra, Lehardy, Duchâtel, Gardien, Boileau, Beanvais, Vigée, Duprat, Mainvielle, and Antiboul were sentenced to death, and, with the exception of Valazé, who stabled himself on hearing his sentence pronounced, all perished by the guillotine. On their way to the Place de Grève, in the true spirit of French republicanism, they sang the Marseilleaise. Constard, Mannel, Cussy, Noel, Kersaint, Rabant St Etienne, Bernard, and Mazuyer went later to the same fate. Biroteau, Grangeneuve, Guadet, Salles, and Barbaronx ascended the scaffold at Bordeaux; Lidon and Chambon at Brives; Valady at Périgneux; Dechèzeau at Rochelle. Rebecqui drowned himself at Marseilles, Pétion and Bnzot stabbed themselves, and Condoret poisoned himself. Sixteen months later, after the fall of the Terrorists, the ontlawed members, including the Girondists Lanjuinais, Defermon, Pontécoulant, Louvet, Isnard, and La Rivière, again appeared in the Convention. See Lamartine's Histoire des Girondins (8 vols. Paris, 1847); and Guadet's Les Girondins (new ed. 1889).

Girtin, Thomas, one of the greatest of the earlier English landscape-painters in water-colours, was born in London, 18th February 1773, and died 9th November 1802. Ho was a close friend and

fellow-student of Turner; and to them many improvements in water-colour painting are due. Girtin struck ont a bolder style than had been attempted, attained great richness of colour and breadth, but was somewhat careless of detail, and sometimes inaccurate in drawing. His best works are panoramic views of London and of Paris.

Girton College, the most notable college for women in England, was instituted at Hitelini in 1869, but removed to Girton, near Cambridge, in 1873. Instruction is given in divinity, modern languages, classics, mathematics, moral science, natural science (including physiology and chemistry), history, vocal music. There are about thirty lecturers, mostly connected with Cambridge University. The mistress and five resident lecturers are ladies. The students, who number above 100, are admitted after an entrance examination; the ordinary comes extends over three years, half of each year being spent in college. 'Degree Certificates' are granted to those who satisfy their examiners as to their proficiency according to the standard of the examinations for the B.A. of Cambridge University; £35 per term covers all college charges.

Givan, an Ayrshire seaport and burgh of barony, is at the mouth of the river Girvan, and 21 miles SSW. of Ayr by rail. The harbour is small, but has been improved since 1881. The valley of the Girvan is one of the most fertile and best-cultivated districts in the south of Ayrshire. The town is opposite Ailsa Ciaig (which is 10 miles W.), was once a thriving seat of weaving, and is now frequented for sea-bathing. Pop. (1851) 7306; (1881) 4505.

Gisborne, a post-town of New Zealand, in the North Island, is situated on the river Thranganui (fine bridge, 1885), 250 miles SE. of Anckland, with which city it has steamer communication. It is the port of entry for Poverty Bay, a name given by Captain Cook in 1769, and sometimes still retained for the town; only small vessels can come up to the wharves, but in 1889 a harbour, to cost £200,000, was in course of construction. In 1886 petrolenm was struck in the neighbourhood. Pop. (1886) 2194.

Gisors, a town in the French department of Eure, on the Epte, 43 miles NW. of Paris by rail. Its double-aisled church, whose choir dates from the 13th century, has a splendid flamboyant portal; and the octagonal donjon of the ruined castle was built by Henry I. of England. Here Richard I. defeated the Freuch in 1198; his watchword, Dicu ct mon Droit, has ever since been the motto of the royal arms of England. Pop. 3960.

Gitschin (Czech Jičin), a town of Bohemia, 60 miles by rail NE. of Prague, with 8071 inhabitants, who manufacture sugar and carry on agriculture. Gitschin was once the capital of the duchy of Friedland, and here Wallenstein built a splendid palace (1630). On 29th June 1866 the Austrians were severely defeated here by the Prussians.

Gingliano, a town of Italy, 8 miles NW. of Naples, with a trade in corn and grapes. Pop. 11,748.

Ginlio Romano. Ginlio Pippi de' Giannazzi, the chief papil of Raphael, and after his death head of the Roman school, was born at Rome about 1492—some authorities say 1498. His excellence as an architect and engineer almost equalled his genius as a painter. Ginlio assisted Raphael in the execution of several of his tinest works, such as the series of the So-called Raphael's Bible in the loggie of the Vatican and the 'Benefactors of the Church' in the Incendio del Borgo, and at Raphael's death he completed the 'Battle of Constantine' and the

'Apparition of the Cross' in the Hall of Constantine in the Vatican. He likewise inherited a great portion of Raphael's wealth and his works of art. The paintings executed by Giulio in initation of Raphael reflect not only the style and character, but the sentiment and spirit of the master; but, on the other hand, his more original creations are deficient in the ideal grace of Raphael, and display rather breadth and power of treatment and boldness of imagination than poetical refinement or elevation. With a thorough knowledge of design he combined a facile skill in composition and a thorough appreciation of classical ideals. Before he left Rome he built the Villa Madama, and adorned it with a fresco of Polyphemus. About the end of 1524 Giulio accepted the invitation of Pederigo Gonzaga, Duke of Mantna, to proceed thither and carry ont a series of architectural and pictorial works. The drainage of the mashes surrounding the city, and the protection of it from the frequent immidations of the rivers Po and Mincio, attest his skill as an engineer; while his genius as an architect found scope in the restoration and adornment of the Palazzo del Te, the cathedral, the streets, and a ducal palaco at Marmirolo, a few miles from Mantna. Amongst the pictorial works of this period were the 'History of Troy,' in the castle, and 'Psyche,' 'Icarus,' and the 'Titaus,' in the Te palace. In Bologna, too, he designed the façade of the church of S. Petronio. Perhaps the best of his oil-pictures are the 'Martyralom of St Stephen' (at Genoa), 'A Holy Family' (Dresden), 'Mary and Jesus' (Louvre), and the 'Madonna delia Gatta' (Naples). Giulio died at Mantna, lst November 1540. See D'Arco's Vitu c Opere di Giulio Romano (1842).

Giurgevo (Ronnanian Giurgiu), a town of Ronnania, on the left bank of the Danube, directly opposite Enstehuk, 40 miles by rail SSW. of Bucharest, of which town it is the port. It imports iron and textile goods, coal, and spirits, and exports corn, salt, and petroleum. It was originally settled by the Genoese in the 14th century, who called it St George. Since 1771 the town has played an important part in all the wars between the Tarks and the Russians. Pop. 20,866.

Giusti, Giuseppe, political poet and satirist, was born 12th May 1809, at Monsummano, near Pistoia. He studied law at Pisa, and for a time practised at Florence; but from 1830 onwards found his sphere as a keen and incisive satirist, writing in brilliant and popular style a series of pocus, in which the enemies of Italy and the vices of the age were mercilessly denounced. But it was not till 1848 that he published a volume of verse under his own name. Save in satire his work is second-rate. He was elected a member of the Tuscan chamber of deputies in 1848, and died 31st March 1850. Annong his most notable poems (all short) were II Dies Irw (1835), Lo Stieule (1836), Girella (1840), Sant' Ambrogio (1844). Editions of his works were published in 1863 and 1877. See Fioretto, Giuseppe Giusti (1877).

Givet, a frontier town and first-class fortress in the French department of Ardennes, on both banks of the Meuse, 31 miles by rail S. of Namur in Belgium, and 193 NE. of Paris. The citadel of Chalemont, on a rock 700 feet above the stream, was reconstructed by Vanban. There are manufactures of lead-pencils, and sealing-wax, copper, wares, soap, &c. Pop. (1872) 4884; (1886) 7370.

Givors, a smoky town in the French department of Rhone, on the right bank of the Rhone, 14 miles S. of Lyons by rail. Glass, especially bottles, and silk and iron goods are extensively manufactured, and a considerable trade in coal is carried on. Pop. (1872) 8912; (1886) 10,110.

Gizeh, or Guizen, a small town in Egypt, on the opposite side of the river from Old Cairo, and approached from Cairo by the great swinging bridge constructed over the Nile in 1872. It was formerly fortified by the Mamelukes, but is now a poor place, though it has some cafes, dilapidated bazaars, and a pop. of 10,500. Artificial egg hatching has been practised here since the days of the Pharaols. The pyramids of Gizeli are not close to the town, but lie live miles away to the west. See PYRAMIDS.

Gizzard. See BIRD.

Glacial Period, or ICE AGE, is a term used in geology to designate that period the records of which are included in the Pleistocene System (q. v.). 'Glacial period' and 'Pleistocene period' are in 'Glacial period' and 'Pleistocene period' are in fact synonymous as regards all northern and temperate regions—the former term being used when the prominent climatic characteristics of the period are thought of, while the latter is employed with reference to its life. The chief geographical and climatic changes of this period, and the general features of its fanna and flora, will be considered under PLEISTOCENE SYSTEM. But here a short account may be given of the relies which furnish evidence of former glucial conditions having obtained evidence of former glucial conditions having obtained in many regions that are now in the enjoyment of temperate climates. It is chiefly in the northern parts of Europe and North America, and the hilly and mountainous districts of more southern latiand monitorial states of more about the glacial deposits, properly so called, are developed. These deposits consist partly of morainic materials, erratics, &c., and partly of marine, fresh-water, and terrestrial accumulations. The most important member of the series is Boulder-clay (q.v.), or, as it is often termed, till. This is an unstratified clay, full of ice worn stones and boulders, which is believed to have been formed and accumulated under glacier-ice. Several disand accumulated under glacier-ice. Several dis-tinct and separate sheets of boulder-clay have been recognised, divided from each other by intercalated 'interglacial beds,' which last are often fossiliferous. The lowest and oldest boulder-clay covers vast areas in the British Islands and northern vast areas in the British islands and hordern Europe—extending south as far as the Bristol Channel and the valley of the Thames in England, and to the foot of the Harz Mountains, &c., in middle Germany. Boulder-clay of the same age spreads over the low grounds of Switzerland, and extends from the great Alpine valleys for many miles into the circumjacent low-lying regions. Similar ground-moraines have been met with in all the monutainous and hilly tracts of Europe, as in central France, the Pyrences, the Spanish Sierras, the mountains of Carsica, the Apennines, the Vosges, the Black Forest, the Erzgebirge and other ranges of Germany, the Carpathians, &c. The rock-surfaces on which the boulder-clay rests are often smoothed and striated, or much crushed and broken, while the hills and mountain-slopes in regions where boulder-clay occurs give evidence of having been abraded and smoothed by glacial of laying been abraded and shootnest by gatern action (see ROCHES MOUTONNERS). At the time the boulder-clay was formed, Scotland, Ireland, the major portion of England, Scandinavia, Denmark, Holland, the larger half of Belgium, Germany as far south as Leipzig, and vast regions in Poland and Russia were covered with a great mer de glace. Contemporaneously with this ice-sheet all the mountain-regions of the central and southern regions of the Continent nonrisbed extensive snowfields and glaciers, which last flowed out upon the low ground often for very great distance. Thus, Lyons stands upon old moraines which have been carried down from the mountains of Dauphine and Savoy. interglacial deposits point to great changes of climate when the snowfields and glaciers melted away, and temperate conditions of climate super-

vened, as is shown by the geographical distribution of these deposits, and by the character of the plant and animal remains which they have yielded. youngest boulder-clay, overlying, as it does, such interglacial beds, proves that the glacial period closed with another advance and final retreat of the Scandinavian ice-sheet and the great glaciers of the Alps, &c. The terminal moraines of the last ice-sheet do not come so far south as those of the first and greatest mer de glare. These moraines show that the ice covered the Scandinavian peninsula, filled up the Baltic, invaded north Germany, and overflowed Finland and wide regions in the partle of Burgie. Similarly in the Alpa War the last the la north of Russia. Similarly in the Alps, &c., the last great extension of the glaciers was not equal to that of the first. See EUROPE.

The bonder-clays are not the only evidence of glacial conditions. Besides those accumulations and the scratched and crushed rock-surfaces already referred to, we encounter numerous erratics (see BOULDERS, ERRATIC), eskers or kames (see ASAR), Giants' Kettles (q.v.), clays with Arctic marine shells and erratics (in Scotland, Prussia, &c.)—the organic remains associated with the glacial deposits often affording strong evidence of cold conditions. The following table shows the general succession of the glacial deposits in several parts of Enrope;

Scotlann—
6. Valley-moraines and fluvio-glacial gravels = small local

d. Valley-moranes and invio-glacial gravels = small local glacies.
5. Kames, erratics, fluvio-glacial deposits, laid down during tetrad of last general rec-covering.
4. Clays, &c., with latelt number shells, occurring up to a height of 100 feet = deposits belonging to the period of retreat of mer de glace, and contemporaneous to a large extent with those of 5.
5. Upper boulder-clay = moraine profonds of latest mer de class.

Upper bounder-day — more disappearance of cold conditions; flothing and peopling of the land-on face with temperate tama and flota; subsequent submergence to not less than 500 or 600 feet below present level.

Lower boulder-day with interculated interglacial fossiliteous beds — the product of more than one mer de place. The lowest clay marks the period of greatest glaciation.

ENOLAND AND IRELAND-

NOLAND AND IRLLAND—

6. Valley-moraines and flavro-glacial gravels.

5 and 4. Kames or eskers, erratics; finvio-glacial deposits.

3. Upper boulder-clay of last ner de glace.

2. Interglacial beds, marine and fresh-water. Disappearance of glacial conditions; land-surface at first; subsequent submergence to considerable extent.

1. Lower boulder-clays with intercalated aqueous deposits, Indicating probably same conditions as 1 in Scottish series.

Series.

NORTHERN EUROPE-4. Sand and gravel; erratics; shelly marine clays (in Baltic

area).

3. Upper boulder-clay and terminal mornines of last mer de glace.
2. Integracial beds, partly fresh-water and terrestrial, partly

Lower boulder-clay = greatest extension of ice.

Switzerland—

4. Fluvio-glacial gravels in terraces.

3. Monaines and upper boulder-clay of last great glaciers.

2. Interglacial beds, with mammalian remains, &c.

1. Lower boulder-clay.

GENTRAL FRANCE——

Fluvio-glacial gravels. Morames.

Interglacial beds, righly fossiliferous, Ground-mornines (Mont Dore).

In North America glacial deposits are developed upon a great scale, and there, as in Europe, the boulder-clays are separated by interglacial deposits. The northern part of the continent was drowned in glace, the ice flowing south into New Jersey, whence its front extended north west through Pennsylvania, after which it trended south west through Ohio and Indiana to reach the 38th parallel of latitude in Illinois. It then appears to have swept away to the north-west in the direction of the Missouri valley. The latest American mer de glace did not come so far sonth—its terminal moraines being well developed in Minnesota, Wis-

consin, Michigan, &c. Evidence of former excessive glacial conditions has been met with in many other parts of the world-old moraines, &c. having been detected in the Cancasus, the mountains of Asia Minor, the Lebanon, the Himalayas, &c. in Asia; in the Atlas, the Kagn and Krome Moun-Asia; in the Anas, the Argi and Nome Honer tains, &c. in Africa; in the Andes, Tierra del Fuego, &c. in South America; in New Zealand, &c. The probable cause of the glacial period is discussed under Pleistocene System.

Glaciation. See GLACIAL PERIOD, GLACIERS.

Glaciers are rivers of snow compacted by pressure into ice, which move slowly from higher to lower levels. In tropical and temperate climates glaciers are found only upon the higher parts of lofty mountains, but at the poles whole continents and great islands are entirely or partially covered

by them.

Distribution.—Their distribution is very extensive: they occur in Greenland, which is almost an entire sheet of ice; on the islands between Greenland and North America; in North America towards the centre, in Alaska and dotted along the Pacific coast, and continued down to the extremity of South America; in Europe, in Norway, among the Pyrenees, and along the Alps; in Asia they pervade the Himalayan system, and appear in Japan and on the opposite mainland. The unexplored Antiarctic continent is, to all appearance, covered entirely by one great ice-sheet of over 10,000 feet in thickness. Traces of their presence in past geo-

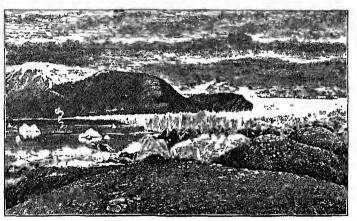
logical ages are even more general, appearing as they do over the larger part of North America, the southern portion of South America, all northern Europe, as well as smaller areas in Africa, Australia, New Zealand, Australia, New Zealand, &c. Of the 1155 glaciers of the Alps, the longest is the Aletsch, 15 miles in length; the depth of the Aar glacier has been estimated at 1510 feet. Next to the Aletsch among European glaciers is one in the Cancasus.

Position.—At and the equator a height of 16,000 feet is necessary for the formation of glaciers, but, as cooler regions are approached, the required altitude becomes less and

less, until the poles are reached, where the ice-sheets are presented emptying themselves into the ocean. But wherever occurring, they are always greatest and most frequent on eminences of the required height, which quent on eminences of the required height, which first meet the vapour-ladeu winds coming from the sea, and presenting a side or sides but little exposed to solar influences. Thus, the Himalaya Mountains, being directly in the track of the south-west monsoon, with no intervening heights of any consequence between them and the ocean, first receive its watery burden, with the consequent formation of the great glaciers of that region. In the same way the Andes of South America, meeting the breezes from the Pacific, bear great ice-sheets upon all their more prominent bear great ice sheets upon all their more prominent peaks. In New Zealand, while the glaciers of the Mount Cook range reach down to 700 feet above the sea on the west side, they reach only to 2000 feet on the east side.

Morement.—On the higher summits of glacier-bearing mountains the snow lies loose, in granular form and comparatively lightly; but, as it is impelled

down the sides of the entinences by gravitation, the pressure of the masses from behind and from the sides gradually hardens and compacts it, until at last the air is driven out, and, the forces from at tast the air is driven out, and, the forces from above acting with greater power from increase of weight and impact, the glacier assumes its best-known form—that of a homogeneous concretion of blue, crystalline ice. Thus slowly pushed forward, the glacier continues to descend, until, in the warmer latitudes, a zone is reached where the sun becomes too newworful above registed, and the ice becomes too powerful to be resisted, and the ice melts, thus forming the headwaters of rivers, many of which take their origin in this way. In more rigorous climates the ice-sheets are pushed down to the lowest-lying grounds, until their edges are protruded into the sea, and until a sufficient depth of water is reached to float the buoyant ice, which is now submerged to two-thirds of its thickness. Partly by the action of the swell, partly because of its own weight, the edge becomes detached from the parent mass, and floats out to sea in the form of Icebergs (q.v.). This process of dissolution is known among whalers as 'calving.' But even in the higher latitudes, such as Greenland, where the temperature is always exceedingly low, the tag the ingner latitudes, shoth as tree mand, where the temperature is always exceedingly low, the ice dissolves and reaches the sea by rivers as well as by icebergs. The melting in such cases is almost entirely due to pressure, the water escaping from below the ice-sheet. The solar influences being weak, even in the height of summer the supply of moisture derived from the exposed surfaces in these regions is small and insignificant.



The edge of the Mair Glacier, Alaska.

Although the onward movement of a glacier is too slow to be perceptible to the eye, it is none the less present and, generally, continuous. J. D. Forbes found (from measurements made by himself in the Mer de Glace, near Chamouni; see ALPS) and first proved that the whole sheet does not possess the same rate of motion, the contra educations was a way ways averaged by the contraction. the centre advancing more rapidly than the sides. He discovered that in summer and in the fall of the year the middle of that glacier drew forward at a rate of from 1 foot 8 inches to 2 feet to 1 foot 7½ inches per diem. Agassiz at about the same time carried on a series of independent experiments on the glacier of the Aar, and arrived at similar conclusions. Helland later on demonstration. strated that in Greenland a more rapid motion was to be found, and that the Jacobshafn glacier advanced at a rate of from 48.2 feet to 64.8 feet in the twenty-four hours. This result has lately been generally confirmed, although somewhat modified, by Dr Rink, who, from a considerable

collection of data, concludes that the quickest rate of progress of the centres of the glaciers of that region averages 21 feet in twenty-four hours. many areas in Greenland, however, the limits of the ice-sheets were found to be almost stationary, and prolonged and careful observations became necessary before any progress could be noted. In these cases the configuration of the ground was the principal cause of the more gentle motion. The variation in the rate of movement in different parts of the mass is analogous to that of rivers, and there are many other points of similarity between glaciers and streams of water which will call for notice below

The above remarks broadly point out the general movements of glaciers, but various modifying agencies are frequently present, which change for a time the regularity of the motion. Thus, when slipping down a steep incline the rate of progress is suppling down a steep merine the rate of progress is much more rapid than when level tracts or rising ground are being traversed. The surface of the ice-sheet, too, travels with somewhat greater velocity than the lower strata, and the nature of the glacier's bed here again produces modifica-When the path is smooth and sloping, the rates of speed at which the upper and under portions advance are much more equal than when obstacles intervene, preventing the lower strata from keeping up an equal ratio of motion with the portions nearer to and at the surface. When the icesheet turns aside from following a straight course and forms a curve, the maximum of motion is no longer in the centre, but at points along the surface nearer to the convex side of the curve.

In temperate and tropical latitudes the exposed top of the glacier is being continually lowered and reduced by evaporation, and it would appear that, as a general rule, the ice musses in such situations lose more by this process than they gain from the snowfalls of winter. When a series of hot summers and mild winters succeed each other, the amount of ice dissolved and conveyed away in the form of running water exceeds considerably the supply brought down from higher levels by gravitation, and the glacier retreats up its bed or valley. On the contrary, when a succession of cold summers and severe winters are experienced, it pushes itself farther down, and appears, through these offects of the seasons, to possess a kind of elasticity.

When decided inequalities in the ground are passed over, the hollows become filled up with ice belonging to the bottom of the glacier, the superincumbent masses passing over them; in this manner icc eddies' are formed. On coming down a sharp declivity the glacier becomes much eracked and fissured, pinnacles and towers become conspicuous, and the whole fall presents a scene of paratively level ground again reached than the pressure exerted by the flow from the heights once more asserts itself, and again cakes the shattered framements into account which which which of the pressure is the shattered framements into account the shall be for the shall be fragments into a smooth, solid whole. Crerasses are cracks in the ice-sheet, at first narrow, and of no great depth; but as the glacier progresses they increase in size, often assuming the dimensions of lunge chasms, frequently reaching from the top to the bottom of the mass and travelling downwards with it, until some temporary stoppage in front presses the edges one against the other, and scals up the orifice.

It has been urged that, when glaciers flow over a level or rising surface, something more than the mere force of gravitation must be sought to account for their forward movement, and the theory has been advanced that water, percolating from the surface through openings into the body of the ice, and there undergoing expansion during the process of freezing, may be a powerful factor in impelling the glacier onwards, where gravitation alone could hardly be sufficient to account for its advance.

Work.-Glaciers have many features in common with rivers. Thus, they have regular drainage areas from which they draw their supplies; they move from higher to lower levels with more or less rapidity as the configuration of the ground varies; the whole mass does not move at the same rate; they carry along with them rocks, boulders, gravel, sand, and earth; they reach the ocean in the forms either of ice or water; and they convey to the sea their burdens of terrnginous materials. Their influence upon marine deposits would, in the present state of our knowledge, appear to be very great-greater, indeed, than that of the largest rivers dis-charging on a bold and little indented coast, and nearly as great as that of large rivers falling into bays and partially enclosed seas. Thus, the contimental marine deposits off the shores of Antarctica extend almost as far out into the ocean as those brought down into the Bay of Bengal and Arabian Sea by the Ganges, Indus, and the other great streams of India, and to an infinitely greater extent than those conveyed by the great rivers of the smooth, east coast of Africa, which empty them-

selves directly into the open ocean.

The formation of moraines is one of the most evident phenomena connected with the work of evident phenomena connected with the work of glaciers. They are of three varieties, known as terminal, lateral, and median. A terminal monaine consists of a gathering of boulders, rubbish, &c., pushed down by the advancing ice-sheet and heaped up before it. When the glacier retreats, the moraine is seen to be of a crescent shape, the extremities pointing backwards and the centre pushed more or less forward—evidence of the receiver rapidly to metion of the centre pushed. greater rapidity of motion of the centre than of the sides of the glacier. Lateral moraines are formed by the demunition of the sides of the bed or valley down which the ice-sheet flows. In its forward movement it scrapes off immense quantities of rubbish from the sides, which, falling on the onter edges of the sheet, are carried forward and downward and thrown off laterally. When two glaciers meet, they coalesee and flow onward as one; the lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting at the video of importance with a lateral unveiting a lateral unveitin lateral moraines at the sides of juncture unite also, and form a medial moraine down the centre of the great trunk glacier. Boulders, so long as they are carried upon the ice-sheets, are in nowise changed by transport, preserving all their angularities and sharp corners. Many of them, however, full into the crevasses, and, reaching the bottom, are ground and rasped along the rocky bed of the ice-stream. These boulders, as well as the solid rocks they are rubbed over, become polished and striated, and in this way evidence of the presence of glaciers is preserved long after they themselves have disappeared, The water discharged from the extremitics of iccfields is always middy, heavily charged with a fine powder, produced by the scraping of rock and ice against rock and soil. In the warmer regions, when a glacier protrudes below the snow-line the amount of water melted from the surface is very eonsiderable, often finding its way into a crevasse and uniting with the water already collected there, produced by the higher temperature prevailing in the lower strata of all glaciers, and resulting from the effects of pressure. The falling water in the course of time drives a shaft or tunnel through the ice at the bottom of the cicvasse, and these shafts are known as moulins. The closing of the crevasse does not necessarily imply the destruction of the monlin, which often remains entire, with a deposit of rubbish, left by the water, all along the bottom, and may come to light again through the opening of a fresh chasm much farther down the

For particulars and discussions regarding glaciers and

their work, see De Saussure's Voyage dans les Alpes; their work, see De Saussure's Voyage dans les Alpes; Agassiz' Elude sur les Glaciers; Crole's Climate and Time; Geilde's Great Ice Age; Forbes's Trarels in the Alps; Tyndall's Glaciers of the Alps; Thomson, Proc. Roy. Soc., 1856-57; Scottish Geog. Mag., vol. v.; Heim, Handbuch der Gletscherkunde (1885); also Dr Frederick Wright's important work, The Ice Aye in North America (New York and Lond, 1889). For the influence of glaciers on marine deposits, see maps by Dr John Murray in the Scottish Geog. Mag., vol. v.

Glacis (allied to glade in the sense of a lawn) is the slope of earth, generally 1 in 20, which inclines from the Covered-way (q.v.) of a fortress towards the country. It obliges the assailants to approach over an open space swept by fire from the fortress, and at the same time masks the general works of the place. See FORTIFICATION.

Gladbach, or Bergisch-Gladbach, an industrial town of Rhenish Prassia, 8 miles NE of Its industries include the manufacture of drag-nets, paper, papier-maché, and gunpowder, and it has zine and various other metal works. Peat is ent in the neighbourhood. Pop. 7928.

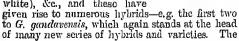
Gladbach, or MONCHEN-GLADBACH, a rapidly growing manufacturing town of Rhenish Prussia, 16 miles W. of Düsseldorf, is the centre of the Rhenish cotton spinning industry. It has also manufactures of silk, wool, linen, and paper, cottonmanufactures of silk, wool, linen, and paper, cotton-printing works, dyeworks, bleachfields, iron-foundries, machine-shops, breweries, and brickworks. Gladbach, which has been a town since 1366, was formerly the seat of an important linen trade; the cotton industry was introduced in the end of the 18th century. The town formerly contained a famous Benedictine abbey, founded in 792, and still possesses a church dating from the 12th and 13th centuries (the crypt from the 8th). Pop. (1858) 13,965; (1871) 26,354; (1885) 44,067, mostly Roman Catholics.

Gladiator (from Lat. gladius, 'a sword'), a professional fighter in the arena of a Roman amphitheatre, against either another gladiator or a wild beast. The custom of giving gladiatorial exhibitions seems to have been borrowed from Etruria, where slaves and prisoners were sacrificed on the tombs of illustrions chieftains. This practice was also common in Greece and the East. At Rome the gladiatorial contests took place at first at funerals only, but afterwards in the amphitheatre; and in process of time they lost all trace of a religious character, and came to be a common form of amusement. The lirst show of this kind that we read of in Roman history was one between three pairs of gladiators, arranged by Marcus and Decins Brutns on the death of their father, in 264 B.C. The fashion rapidly gained ground, especially during the last years of the republic, and as it did so it became customary for magistrates, public officers, and candidates for the popular suffrages to give gratnitons gladiatorial exhibitions to the people. But the emperors executed all others in the extent and magnificence of these spectacles. Julius Caesar gave a show at which 320 couples fought; Titus gave an exhibition of gladiators, wild beasts, and sea-fights which lasted 100 days; Trajan one of 123 days, in which 10,000 men fought with each other or with wild beasts for the amusement of the Beasage and the tests for the amusement of the Romans; and the taste for these cruel spectacles spread through every part of the extensive Roman empire. Even under the republic efforts had been made to limit the number of gladiators, and to diminish the frequency of these spectacles. Cicero proposed a law that no man should give one for two years before becoming a candidate for office. The Emperor Augustus forbade more than two shows in a year, or that one should be given by a man worth less than half a million sesterces. Constantine in 325 prohibited gladiatorial contests

altogether; but their final abolition was due to the splendid daring of Telemachus, an Asiatic monk, who in 404 journeyed to Rome, and there, rushing into the arena, strove to part two gladiators. The spectators stoned him to death, but the Emperor Honorius proclaimed him a martyr, and issued an ediet suppressing such exhibitions. The gladiators were for the most part, and always at first, prisoners taken in war and slaves, with the worst classes of criminals. But in the times of the emperors freemen and men of broken fortunes began to enter the profession; and later on knights and senators fought in the arena, and even women. The Emperor Commodns was particularly proud of his skill and provess as a gladiator. The successful combatant was at first rewarded with a palm branch, but in later years it became the custom to add to this several rich and valuable presents and a substantial prize of money. He was in fact the hero of the hour, like the espada of the Spanish bull-ring. It used to be commonly understood that, after a gladiator had been thrown down or disarmed, if the spectators turned up their thumbs, they wish the vanquished man's life to be spared, and, if they turned them down, that he was to be slain. So it is interpreted in Gérome's famons picture. But this is certainly erroneous. The question mainly turns on the interpretation of rertere politicem and premere politicem. Mayor takes the first phrase to mean 'to turn the thumb towards the breast, as the signal for dropping the sword.' Wilkins takes premere as closing the thumb on the hand; and infestus police, the a substantial prize of money. He was in fact the the thumb on the hand; and infestus pollex, the signal for death, seems to have been an upturned thumb. Gladiators were trained in special schools; and it was regarded as a legitimate business to keep them and let them out on hire. The revolt of Spartacus (q.v.), the gladiator, and his companions forms an exciting episode in Roman history. Gladiators were known by different names according to the arms, offensive and defensive, that they wore. Thus, the Samuites carried a shield, helmet, greave, some kind of defensive armour signal for death, seems to have been an upturned

some kind of defensive armour on the elest, and a short sword; the retiarii carried a trident and a net to entangle their opponents; the laquearii had a noose or lasso.

Gladi olus, a genus of Iridacea (q.v.), with beantiful spikes of flowers, swoul-shaped leaves (whence the name-dim. of Lat. gladius, 'a sword'), and corms or bulbous rhizomes. Several species are European (G. palustris, communis, &c.), though none are British; the majority, however, are from the Cape. They are propagated by offset corms or from seed: in this way innumerable hybrids have been produced. The hardy European forms well ar.e adapted to the mixed border, wild garden or shrubbery in dry and snnny situations. Among the leading Cape forms are G. cardinalis (red), psit-tacinus (yellow with purple spots), floribundus (purple and Gladiolus Ramosus, white), &c., and these have





scarlet G. brenchleyensis is similarly a standard of the corn of G. communis was formerly officinal; and the Hottentots dig up some of the Cape species for the sake of their starchy corns. See Nicholson's Dictionary of Gardening; Robinson's Flower-garden, &c.

Gladstone, WILLIAM EWART, statesman, orator, and author, was born in Rodney Street, Liverpool, on the 29th of December 1809. He is the fourth son of Sir John Gladstone (1764–1851), a well-known and it might almost be said a famous Liverpool merchant, who sat for some years in Inverpool merchant, who sat for some years in parliament, and was a devoted friend and supporter of George Canning. Mr Gladstone is of Scotch descent on both sides, and has declared more than once in a public speech that the blood that runs in his veins is exclusively Scottish. He was educated at Eton and at Christ Church, Oxford. He became at Eton and at Christ Church, Oxford. He became a student at Oxford in 1829, and graduated as a double first class in 1831. He had distinguished himself greatly as a speaker in the Oxford Union Debating Society, and had before that time written much in The Eton Miscellany, which indeed he helped to found. He appears to have begun his career as a strong opponent of all advanced measures of political reform. In the Oxford Union he proposed a vote of censure on the government of Lord Grey for introducing the great Reform Bill which was carried in 1832, and on the Duke of Wellington because of his having yielded to the claims for Catholic emancipation. He also opposed a motion in favour of immediate emancipation of the slaves in our West Indian islands. He soon became known as a young man of promise, who would be able to render good service to the Conservative party in the great struggle which seemed would be able to render good service to the conservative party in the great struggle which seemed likely to be forced upon them—a struggle, as many thought, for their very existence. It was a time of intense political cutotion. Passion and panic alike prevailed. The first great 'leap in the dark' had been taken; the Reform Bill was carried; the sceptre of power had passed away from the aristocracy and the privileged ranks to the middle and lower middle classes. The Conservative party were looking eagerly out for young men of promise were looking eagerly out for young men of promise to stiffen their ranks in the new parliament—the first elected under the Reform Bill, the first which the middle-class had their due share in creating; the first in which such cities as Manchester and Liverpool and Birmingham were allowed to have representation.

Mr Gladstone was invited to contest the burgh of Newark in the Conservative interest, and he had the support of the great Neweastle family. He stood for Newark, and he was elected. He delivered his maiden speech on a subject connected with the great movement for the emancipation of the Vectorials. the West Indian slaves; but he seems to have confined himself mainly to a defence of the manner in which his father's estates were managed, the course of the debate having brought out some charge against the management of the elder Gladstone's possessions in one of the West Indian islands. The new orator appears to have made a decided impression on the House of Commons. His manner, his voice, his diction, his fluency were alike the subject of praise. Mr Gladstone evidently continued to impress the House of Commons with continued to impress the Honse of Commons with a We get sense of his great parliamentary capacity. sense of his great parliamentary capacity. We get at this fact rather obliquely; for we do not hear of his creating any great sensation in debate; and to this day some very old members of the House insist that for a long time he was generally regarded as merely a fluont speaker, who talked like one reading from a book. But on the other hand we find that he is described by Macaulay in 1839 as 'the rising hope' of the 'stern and unbending Tories,' and the whole tone of Macaulay's essay—a criticism of Gladstone's first serious attempt at authorship, his book on the relations between church and state—shows that the critic treats the anthor as a young man of undoubted mark and position

in the House of Commons.

In December 1834 Sir Robert Peel appointed Gladstone to the office of a Junior Lord of the Treasury. In the next year Peel, who was quick to appreciate the great abilities and the sound commercial knowledge of his new recruit, gave to him the more important post of Under-secretary for the Colonies. Gladstone looked up to Peel with intense admiration. There was much to draw the two men together. Knowledge of linance, thorough understanding and firm grasp of the principles on which a nation's business must be conducted—perhaps it may be added a common origin in the middle-class—these points of resemblance might well have become points of attraction. But there were other and still higher sympathies to bring them close. The elder and the younger man were alike earnest, profoundly earnest; filled with conscience in every movement of their political In December 1834 Sir Robert Peel appointed were alike earnest, profoundly earnest; filled with conscience in every movement of their political and private lives; a good deal too earnest and serious perhaps for most of the parliamentary colleagues by whom they were surrounded. Mr Gladstone always remained devoted to Peel, and knew him perhaps more thoroughly and intimately than any other man was privileged to do. Peel went out of office very soon after he had made Mr Gladstone Under-secretary for the Colonies. Lord John Russell had brought forward a series of motions on the ominons subject of the Irish Church, and Peel was defeated, and resigned. It is almost notions on the ominons subject of the Irish Church, and Peel was defeated, and resigned. It is almost needless to say that Gladstone went with him. Peel came back again to office in 1841, on the fall of the Melbourne administration, and Mr Gladstone became Vice-president of the Board of Trade and Master of the Mint, and was at the same time sworn in a member of the Privy-council. In 1843 he became President of the Board of Trade. Early in 1845 he resigned his office because he could not approve of the policy of the government with regard to the Maynooth grant.

The great struggle on the question of the reneal

The great struggle on the question of the repeal of the Corn Laws was now coming on. It would be impossible that a man with Mr Gladstone's turn be impossible that a man with Mr Giaustone's turn of mind and early training could have continued a protectionist when once he had applied his intellect and his experience to a practical examination of the subject. Once again he went with his leader. Peel saw that there was nothing for it but to accept the principles of the Free-trade party, who had been bearing the fiery cross of their peaceful and noble agitation all through the country, and were gathering adherents wherever they went. were gathering adherents wherever they went. It is utterly unfair to say that Peel merely yielded to the demands of an agitation which was growing too strong for him. The more generous and the more truthful interpretation of his conduct is that the agitation first compelled him to give his attention to the whole subject; and that as he thought it out he became converted and convinced. When the agitation began, and for long after, Lord John Russell and the Whigs generally were no whit more inclined to free trade than Sir Robert Peel

and Mr Gladstone.

It is a somewhat curious fact that Mr Gladstone was not in the House of Commons during the eventful session when the great battle of free trade was fought and won. In thorough sympathy with Peel, he had joined the government again as Colonial Secretary. Knowing that he could no longer be in political sympathy with the Duke of Newcastle, whose influence had obtained for him the representation of Newcastle, be held given up his the representation of Newark, he had given up his seat, and did not come into parliament again until the struggle was over. At the general elections in

1847 Mr Gladstone, still accepted as a Tory, was chosen one of the representatives for the university

of Oxford.

Up to the time of the abolition of the Corn Laws, or at least of the movement which led to their abolition, Mr Gladstone had been a Tory of a rather old-fashioned school. The corn-law agita-tion probably first set him thinking over the possible defects of our social and legislative system, and showed him the necessity for reform at least in one direction. The interests of religion itself at one time seemed to him to be bound up with the principles of the Tory party; and no doubt there was a period of his career when the principle of was a period of his career when the principle of Protection would have seemed to him as sacred as any other part of the creed. With a mind like his, inquiry once started unist go on. There was always something impetuous in the workings of his intellect, as well as the rush of his sympathy. He startled Europe, and indeed the whole civilised world, by the terrible and only too truthful description which he gave in 1851 of the condition of the tion which he gave in 1851 of the condition of the prisons of Naples, under the king who was known by the nickname of 'Bomha,' and the cruelties which were inflicted on political prisoners in par-ticular. Again and again in Mr Gladstone's public life we shall see him carried away by the same generous and passionate emotion on behalf of the vietims of despotic cruelty in any part of the world. Burke himself could not be more sym-

world. Burke himself could not be more sympathetic, more earnest, or more strong.

By the death of Sir Robert Peel in 1830 Mr Gladstone had lost a trusted leader and a dear friend. But the loss of his leader had brought Gladstone himself more directly to the front. It was not until after Peel's death that he compelled the House of Commons and the country to recognise in him a supreme master of parliamentary debate. The first really great speech made by Mr Gladstone in parliament—the first speech which could fairly challenge comparison with any of the could fairly challenge comparison with any of the finest speeches of a past day—was made in the debate on Mr Disracli's budget in the winter of 1852, the first session of the new parliament. Mr Disraeli knew well that his government was doomed to fall. He knew that it could not survive that debate. It was always one of Mr Disraeli's peculiarities that he could fight most brilliantly when he knew that his cause was already lost, That which would have disheartened and disarmed other men scenned only to animate him with all Macbeth's wild courage of despair. Never did his gift of satire, of invective, and of epithet show to more splendid effect than in the speech with which he closed his part of the debate and mercilessly assailed his opponents. Mr Disraeli sat down at assated his opponents. In District Sac down at two o'clock in the morning, and then Mr Gladstone rose to reply to him. Most men in the house, even on the Opposition side, were filled with the belief that it would be impossible to make any real impression on the limine after such a speech as that of Mr Disraeli. Long before Mr Gladstone had concluded every one admitted that the effect of Mr Disraeli's speech had been outdone and outshone. From that hour Mr Gladstone was recognised as one of the great historic orators of the English parliament—a man to rank with Bolingbroke and Chatham and Pitt and Fox. With that speech began the long parliamentary duel between these two great masters of debate, Mr Gladstone and Mr Disraeli, which was carried on for four-and-twenty years.

On the fall of the short-lived Tory administration Lord Aberdeen came into office. He formed the famous Coalition Ministry. Lord Palmerston took what most people would have thought the uncongenial office of Home Secretary. Lord John Russell became Secretary for Foreign Affairs. Mr

Gladstone, who with others of the 'Peelites,' as they were called, had joined the new administra-tion, was Chancellor of the Exchequer. His speech on the introduction of his first budget was waited for with great expectation; but it distanced all expectation. It occupied several hours in delivery, but none of those who listened to it would have wished it to be shortened by a sentence. It may be questioned whether even the younger Pitt, with all his magic of voice and style and pluase, could lend such charm to each successive budget as Mr Gladstone was able to do. A budget speech from Mr Gladstone came to be expected with the same kind of keen artistic longing as waits the first performance of a new opera by some great composer. A budget speech by Mr Gladstone was a triumph in the realm of the fine arts.

The Crimean war broke up the Coalition Ministry. A motion by Mr Roebuck for inquiry into the condition of the army before Sebastopol was carried by a large majority against the government. Lord Aberdeen at once resigned. Lord Derby was sent for by the Queen, but he could not see his way to form a cabinet without Lord Palmerston, and Lord Palmerston would not go with him. Lord John Russell was summoned, but did not believe he could succeed. In fact, Lord Palmerston was the one indispensable man, and he became prime-minister. Mr Gladstone held his former office for a short time; but when Lord Palmeaston gave way to the demand for the appointment of the committee of inquiry, Mr Gladstone believed that as he had conscientionally opposed the appointment of such a committee, he ought not to remain a member of a eabinet which was willing to accept it. His conviction was shared by his Peelite colleagues, Sir James Graham and Mr Sidney Herbert, and they too retired from office. Mr Glad-stone gave the government of Lord Palmerston a general support, until, after the attempt of Orsini on the life of the Emperor Napoleon III. in 1858, Palmerston introduced his ill-fated Conspiracy to Murder Bill. Mr Gladstone strongly supported the amendment to the motion for the second reading, which declared that before introducing any proposal for an alteration in the law of conspiracy the government ought to have replied to the French despatch, which virtually accused England of lending her protection to foreign assassins. The government was defeated, Lord Palmerston resigned, and Lord Derby was called on to form a new ministry.

The short stay of the Conservative party in office

gave to Mr Gladstone an opportunity of accepting a mission which must have been very much after his own heart. This was the famous visit to the

Ins own heart. This was the famous visit to the Ionian Islands (q.v.) in 1858.

The year 1859 saw Lord Palmerston back again in office and Mr Gladstone in his old place as Chancellor of the Exchequer. The budget of 1860 was renarkable, as it contained the provisions for the reduction of the wine-duties and the whole simplified system of taxation intended to apply to the commercial treaty which Mr Colden had suc-ceeded in persuading the emperor of the French to accept. Air Gladstone also introduced a provision for the abolition of the duty on paper—a duty which was simply a tax upon reading, a tax upon popular education. The House of Lords struck out this clause; a somewhat impassioned popular editation followed: and in the part session the agitation followed; and in the next session the Lords passed the measure for the repeal of the duty without offering any further opposition. The death of Lord Palmerston in 1865 called Lord Russell to the position of prime minister and made Mr Gladstone leader of the House of Commons. Mr Gladstone's mind had long been turning in the direction of an extension or rather expansion of the

suffrage. It was assumed by every one that, Lord Russell and Mr Gladstone being now at the head of affairs, a reform bill would be sure to come. come: a very moderate and cautious bill, enlarging the area of the franchise in boroughs and counties. The Conservative party opposed it, and were supported in their opposition by a considerable section of the Liberals, who thought the measure was going too far on the road to universal suffrage and the rule of the democracy. The bill was defeated, and the Liberal statesmen went out of office (1866). Mr Gladstone had carried his point, however, for when Mr Disraeli came into office he saw that a reform hill was inevitable, and he prepared his party, or most of them, for the course which would have the best learner. In have to be taken. In the very next session Mr Disraeli introduced a Reform Bill of his own, which was enlarged and expanded nntil it became practically a measure of household suffrage for cities and boroughs.

Somewhere about this time the attention of Mr Gladstone began to be attracted to the condition of Ireland. The distressed and distracted state of Ireland, the unceasing popular agitation and discontent, the Fenian insurrection, brought under content, the remain insurrection, brought under England's very eyes by the scheme for an attack on Chester Castle—all these evidences of initially in Ireland's system led Mr (Hadstone to the conviction that the time had come when statesmanship must seek through parliament for some process of remedy. Mr (Hadstone came after a while to the conclusion that the Protestant state aburch in conclusion that the Protestant state church in Ireland must be disestablished and disendowed, that the Irish land tenure system must be reformed, and that better provision must be made for the higher education of the Catholics of Ireland. He made short work with the Irish state church. He defeated the government on a series of resolutions. foreshadowing his policy; the government appealed to the country; the Liberals returned to power, and Mr Gladstone became prime-minister (1868). In his first session of government he disestablished and disendowed the state church in Ireland. In the next session he passed a measure which for the first time recognised the right of the Irish tenant to the value of the improvements he had himself made at his own cost and labour. Never probably was there such a period of energetic reform in almost every direction as that which set in when Mr Gladstone became prime-minister. For the first time in English history a system of national education was established. The Ballot Act was passed for the protection of voters. The system of purchase in the army was abolished—by something, it must be owned, a little in the nature of a coup d'état. Then Mr Gladstone introduced a measure to improve the condition of university education in Ireland. This bill was intended almost altogether for the benefit of Irish Catholics; but it did not go far enough to satisfy the demands of the Catholics, and in some of its provisions was declared incompatible with the principles of their church. The Catholic members of the House of Commons voted against it, and with that help the Conservatives were able to throw out the hill (1873). Mr Gladstone tendered his resignation of office. But Mr Disraeli declined just then to undertake any responsibility, and Mr Gladstone had to remain at the head of affairs. The great wave of reforming energy had, however, subsided in the country. The period of reaction had come. The by-elections began to tell against the Liberals. Mr Gladstone suddenly dissolved parliament and appealed to the country, and the answer to his appeal was the election of a Conservative majority. Mr Disraeli came back to power, and Mr Gladstone retired from the leadership of the House of Commons (1874).

For a while Mr Gladstone occupied himself in literary and historical studies, and he published essays and pamphlets. But even in his literary studies Mr Gladstone would appear to have always kept glancing at the House of Commons, as Charles V. in his monastery kept his eyes on the world of politics outside. The atrocious conduct of the of politics ontside. The atrocious conduct of the Turkish officials in Bulgaria aroused his generous from his study to preach a crusade against the Ottoman power in Europe. The waters rose and lifted him, whether he would or no, into power. The parliament which had gone on from the spring of 1874 was dissolved in the spring of 1880, and the Liberals came in with an overwhelming majority. The period of reaction had gone, and the period of action was come again. Mr Gladstone had to become prime-minister once more. His name was, to adopt the phrascology of continental politics, the only name that had come out of the voting urns.

It was an unpropitions hour at which to return to office. There were troubles in Egypt; there was impending war in the Soudan and in South Africa. There was something very like an agrarian revolu-There was sometimes very that the Home Rule party in the House of Commons was under new, resolute, and uncompromising leadership. Mr Gladstone in the House of Commons was infect new, resonce, and uncompromising leadership. Mr Gladstone succeeded, nevertheless, in carrying what night be called a vast scheme of parliamentary reform, a scheme which established something very near to universal suffrage, arranged the constituencies into proportionate divisions, extinguished several small boroughs, leaving their electors to vote in their county division, and in general completed the work leaving in 1832 and corried further in 1867. It is to begun in 1832, and carried further in 1867. It is to the credit of the Conservative party that after a while they co-operated cordially with Mr Gladstone in his reforming work of 1885. This was a trimpple for Mr Gladstone of an entirely satisfactory character; but he had sore trials to counterbalance it. He found himself drawn into a series of wars in North and South Africa; and he whose generous sympathy had of late been so much given to Ireland, and who had introduced and carried another land bill for Ireland, found that in endeavouring to pass the measures of coercion which the authorities in Dublin Castle deemed advisable, he had to encounter the fiercest opposition from the Irish members of parliament and the vast bulk of the Irish population. That time must have been for a man of Mr Gladstone's nature a time of darkness and of pain. Lord Frederick Cavendish and Mr Burke were assassinated in Dublin; General Gordon perished at Khartoum. In the end the Irish members coalesced with the Conservatives in a vote on a clause in the budget, and Mr Gladstone's government was de-feated. Lord Salisbury came back into office, but not just then into power. His was a most precarious position, depending on the course which might be taken by the Irish members. He was ont of He was out of office in a few months, and then the general elections came on. These elections were to give the first opportunity to the newly-made voters under Mr Gladstone's latest reform act; and these voters sent him back into office and apparently into power once again.

The use Mr Gladstone made of office and of power astonished his enemies, and startled and shocked not a few of his friends. His government had had in the years between 1881 and 1884 to fight a fierce battle against the policy of obstruction organised by Mr Parnell, the leader of the Home Rule party. The obstruction was organised to prevent or delay the passing of coercion measures, and to force the attention of the British public to the claims of Ireland. The struggles that were carried on will be always memorable in the history of parliament. The fiercest passions were aroused on both sides, and at one time Iveland seemed to have come to regard Mr Gladstone as her worst enemy. Many a statesman in his place might have allowed himself to be governed by a feeling of disappointment and resentment. But when the elections under the new and extended Reform Bill were held, and the Irish Nationalist party came back 87 members out of the whole Irish representation of 103, Mr Gladstone made up his mind that the voice of the Irish people was in favour of Home Rule, and he resolved to stake power and popularity on an acceptance of their demand. In March 1886 he brought in a measure to give a statutory parliament to Ireland. A sudden and serious split took place in his party; some of his most influential colleagues declared against him; the hill was rejected on the second reading, and Mr Gladstone appealed to the country, only to he defeated at the general elections. Opinion is still divided—may be divided for ever—as to the wisdom of his policy; but no impartial man can deny him the credit of his sacrifice and the sincerity of his intentions. Then the Conservative party came back into office, and with the help of Liberals who had declined to follow Mr Gladstone came back with a powerful majority; and for the time the ministerial career of Mr Gladstone was closed. He however relaxed nothing of his public activity, and continued to lead the Opposition in the House of Commons.

Mr Gladstone will find his fame as a statesman and an orator. We have taken little account here of his contributions to literature; his Homeric studies; his various essays in political and literary, in ecclesiastical, and even in theological, criticism. For another man these in themselves would have made a not inconsiderable reputation; but to the world they are interesting chiefly as illustrating a marvellous mental activity stretching itself out in every direction; unresting in the lest sense of the word; incapable of settling down into even momentary idleness. 'Repos ailleurs' seems to have been the motto of Mr Gladsone's career—lest are bleaved by the sense of the s rest come elsewhere-this is the world of activity and of labour. His work as a statesman has been almost unique. Probably there is no other English minister who leaves behind him so long and so successful a record of practical legislation; and, as we have seen, some of the best legislation accomplished by his political opponents was initiated by him, was his own work taken out of his hands. As a parliamentary debater he never had a superior-it is doubtful whether he ever had an cqual-in the whole of the political history of these countries. There have been even in our own time orators who now and then shot their arrows higher; but so ready, so skilful, and so unerring an archer as he, taken all round, never drew bow on modern parliamentary battle-ground. Nature had given him an exquisite voice—sweet, powerful, easily-penetrating, capable of filling without effort any public building however large—vibrating to every enotion. The incessant training of the House of Commons turned naturo's gifts to their fullest account. He was almost too fluent; his eloquence sometimes carried him away on its impassioned tide; but his listeners were seldom inclined to find fault with this magnificent exuberance. We should be inclined to rank him as one of the greatest orators, and the very greatest debater, of the House of Commons.

Among Mr Gladstone's works are The State in its Relations with the Church (1838); A Manual of Prayers from the Liturgy (1845); Two Letters on the State Persecutions of the Naapolitan Government (1851); Studies on Homer and the Homeric Aye (3 vols. 1858); A Chapter of Autobiography (1868); Juventus Mundi (1869); The Vatican Decrees, bearing on Civil Allegiance (1874); Vaticanism (1875); Homeric Synchronism (1876); Gleanings of Past

Years (7 vols. 1879); and The Irish Question (1886). His Life has been written by John M'Gilchrist (1888), G. Barnett Smith (2 vols. 1879), and Thomas Archer (4 vols. 1883). See also Justin M'Carthy's History of our Own Times (4 vols. 1879-80); J. H. M'Carthy's England under Gladstone, 1880-84 (1884); and Prof. J. Veitch's 'Mr Gladstone's Ancestors,' in Fraser's Magazine, June 1880.

Glagolitic Alphabet, one of the ancient Slavonic alphabets, apparently derived from the enrive Greek of the 9th century, and somewhat older than that by which it was superseded, the Cyrillic alphabet (for which see SLAVONIC LANGUAGES). It is only used in the liturgical books of the Dalmatian Slavs.

Glairine, another name for Baregine (q.v.).

Glaisher, James, meteorologist, was born in London in 1809. When twenty years of age he began to make meteorological observations as an officer of the Ordnance Survey of Ireland. For three years from 1833 he was employed in the observatory at Cambridge, and in 1836 removed to Greenwich, where four years later he became superintendent of the magnetical and meteorological department of the Royal Observatory, a post which he held for thirty-four years. Since 1841 he has prepared the annual and quarterly meteorological reports issued by the registrar-general. Between 1862 and 1866 he made twenty-eight balloon ascents for the purpose of studying the higher strata of the atmosphere, on one occasion reaching a height of over 7 miles (see Brit. Assoc. Rep., 1862-66, and Balloon). Mr Glaisher was the founder of the Royal Meteorological Society, and became a Fellow of the Royal Society in 1849. He has written numerous works and papers on subjects relating to astronomy and meteorology. In 1879-83 he published a complement to Burckhardt and Dace's Factor Tables.

Glamorganshire (in Welsh, Gwlad Morgan), the most southerly of the counties of Wales, is bounded S. and S.W. by the Bristol Channel, N.W. by Caermarthen, N. by Brecknock, and E. by Monmouth. Area, 855 sq. m.; pop. (1801) 70,879; (1841) 171,188; (1871) 397,859; (1881) 511,433. This increase (700 per cent.), which is unexampled in the kingdom, has been brought about by the development of the coal and iron industries. In the western portion of the county the coast is indented by Swansea Bay, from which it projects westward into the peninsula of Gower. The northern district is covered with rugged hills, the highest of which, however, Llangeinor, is only 1859 feet in height. This district comprises one of the richest coalfields in the kingdom. The southern portion of the county consists of a series of fertile valleys, richly wooded and with a mild climate, the finest being the Vale of Glamorgan, the 'garden of Wales.' The soil is a deep rich loam resting on limestone, and is excellently adapted for the growth of cereals. The mountainous district is intersected by numerous picturesque valleys, affording good pastnrage for sheep and cattle. The chief rivers—the Rhymney, Taff, Neath, Tawe, and Llwchwr—flow southward into the Bristol Channel. Besides coal, anthracite or stone-coal, coking-coal, ironstone, and Imestone are found. At Merthyr-Tydvil and Dowlais are large ironworks; at Swansea, Neath, Aberavon, large copper-smelting works. Tin and lead are also smelted in the county. Wheat, barley, oats, and potatoes are largely produced. The farms are generally small, and agriculture is not in a highly advanced state. The county sends five members to parliament; the represented boroughs are Merthyr-Tydvil (with two), Swansea town (two), and the Cardiff boroughs (one). Glamorganshire contains some interesting Roman remains,

and many ruined memorials of the middle ages. Of these last Oystermouth Castle, Caerphilly Castle, and Castle Coch are the finest specimens. Cardiff Castle is a fine restored edifice. See Thomas Nicholas, *History of Glumorganshire* (1874).

Glance (Ger. Glanz), a term often applied in popular language, and also by mineralogists, to a munerous order or family of minerals, of which Galena (q.v.) or Lead-glance may be regarded as a type. All of them are metallic, and many of them are known by names indicating the metal which is their principal constituent, as Lead-glance, Silverglance, Bernath-glance, &c. In these and many other species the metal is combined with sulphur, so that the mineral is a sulphuret; but there are also numerous species of glance in which sulphur is not present, but selenium, arsenic, or tellurium takes its place. In some kinds, also, two or more metals are present instead of one, in combination with one or other of these non-metallic or semimetallic sulstances. Thus, Gold-glance, or Silvante, consists of gold and silver in combination with tellurium; it occurs in veins in porphyry, in Transylvania, and is wrought for the sake of both the precions metals which it contains. Several kinds of glance are very valuable ores, as Lead-glance or Galena, Copper-glance or Redruthite, and Silver glance or Argentite. Although some mineralogists have adopted the names Pyrites, Glance, and Blende as names of orders or families, the limits and distinctions of these groups are not well marked. All kinds of glance are fused without much difficulty by the blowpipe. They are also soluble in acids.

Glance-coal. See ANTHRACITE, and COAL.

Glanders, or Equina, a malignant, contagions, and fatal disease of the horse and ass, due to the introduction into the body, or perhaps to development within it, of a virulent organism called the Bacillus malloi. Discovered by Dr Strück of Berlin, and almost identical with the microbe of tuberculosis, this organism is about \$\pi_0\pi_0\pi_0\pi\$ th to \$\pi_0\pi_0\pi_0\pi\$ th of an inch broad, but varies from \$\pi_0\pi_0\pi\$ to \$\pi_0\pi_0\pi_0\pi\$ th of an inch in length. This microbe, whilst infecting the whole system, shows specific effects more especially upon the inucous membrane of the nose, upon the lungs, and on the lymphatic system. Glanders and its modification Farcy are capable of transmission to man—on whom the virus increases in malignancy—to sheep, goats, dogs, the feline species, and even to unce and rabbits; pigs and fowls resist the contagion, and until lately cattle were thought to do so, but experiments have thrown doubt upon this.

In a typical case of glanders ulcers form in the nose, characterised by ragged and inflaned edges, discharging a viscid or sticky pus; a hard tumour forms under the jaw; the animal usually loses condition very rapidly; farcy buds and ulcers appear on the skin in various regions of the body; the limbs swell; and the animal dies a loathsome object. Any cause which interferes with the purity or integrity of the horse's blood or produces a deteriorated or depraved state of his system predisposes to glanders. It has been frequently developed in healthy animals by their breathing for a short time a close, impure atmosphere, and cases of this sort were thus produced amongst the horses of several cavalry regiments during their transport in badly constructed, overcrowded vessels to the Crimea in 1854. Confined, overcrowded, badly ventilated stables are almost equally injurious, for they prevent the perfect aeration of the blood, and the prompt removal of its organic impurities. Bad feeding, hard work, and such reducing diseases as diabetes and influenza also rank amongst the causes of glanders. Government by the Act Vict. 16 and 17, of date

14th Angust 1853, very properly compels the immediate destruction of every glandered horse, Glanders, like farcy, is dealt with by the Contagious Diseases Acts, 1878-86. Horses frequently have the disease in a chronic form, and if well fed and managed they might sometimes live and work for years in this condition: in the old coaching days some stages were known to be worked by glandered teams. But no animal with glander ons ulcers or discharge should on any account be preserved; for, besides being perfectly incurable, the fatal disease is communicable not only to healthy horses, but also to human beings. The symptoms of glanders in man are very similar to those in horses, the disease in man being generally regarded as fatal. The only available treatment consists in good untrition, tonics, disinfectants, and detergent applications. In 1889 one of two Viennese surgeons who had been experimenting with bacilli from a human case of glanders, and artificial cultures from these bacilli, was infected with this disease in its most malignant form, and died.

Glands are secreting structures, the component elements of which in various ways alter the naterial brought to them by the blood, extracting and excreting waste products as in the kidneys, or manufacturing valuable by products, such as the glycogen and bile of the liver. In a typical gland three parts have to be distinguished: (a) the secreting cells usually enclosed in some more or less distinct membrane; (b) the surrounding network of blood-vessels; and (c) the duct by which the products of secretion pass from the gland.

the products of secretion pass from the gland.

Most true glands are pockets of glandular skin, nuceous membrane, or epithelium, and occur on the outer surface of the body, as in the sweat-glands of the skin; on the lining of the alimentary canal—e.g. salivary glands, liver, pancreas, intestinal glands, &c.; or on other internal surfaces—e.g. in connection with the genital ducts. They may be classified according to their origin from (1) the cetoderm or epiblast, (2) the mesoderm or mesoblast, and (3) the endoderm or hypoblast. Thus, (1) in connection with the outer skin there are, besides glandular cells (so-called unicellular glands), numerous secretory pockets, such as the sweat, seent, anal, poison, adhesive, byssus, sline, spinning, and mammary glands. At each end of the (endodermic) gut there is a more or less prolonged invagination of ectoderm, and the glands connected therewith are obviously in the above embryological category. (2) The kidneys of most animals illustrate glands of mesodermic origin, but

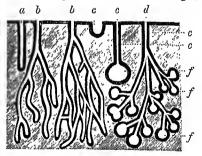


Diagram of Clands (from Hertwig): a, simple tubular gland; b, branched tubular glands; c, simple actions glands; d, branched actions gland; e, duet of gland; f, sac of gland.

it is inaccurate to speak of the reproductive organs (as is often done) as glands. They liberate reproductive cells, differentiated elements, not products of secretion. (3) The numerous glands

connected with the main part of the alimentary

canal are of endodermic origin.

The structure of secretory pouches varies greatly, and, as the accompanying diagram suggests, glands may be classified according to their morphological complexity, as tubular, saccular, lobed, much branched or racemose, &c. The more complex glands—e.g. liver or kidney—will be discussed under their proper headings. In all simple glands the pouch is at first a mere sac; but as the epithelium increases greatly, and yet is more or less cir-cumscribed in its expansion, lobing and branching naturally result.

A third classification of glands is possible—viz. according to their functions—excretory or secretary, inbricatory or digestive, and so on. The various functions, or the nervous, vascular, cellular, and altimately chemical changes associated with the different glands, will be discussed under separate headings. See DIGESTION, KIDNEY, LIVER, SALIVARY GLANDS, SECRETION, &c.

Many structures are often called glands, which are so far removed either instructure or in function with the second second provided in the second se

or in both from those above mentioned that the term is misleading. Such are the reproductive organs, the 'pineal gland,' the spleen, the thyroid and thymns 'glands,' the 'lymphatic glands,' the supra-renal capsules, and so on.

DISEASES OF THE GLANDS.—The 'lymphatic glands' are subject to enlargement from acute inflammation and abscess, usually in consequence of flammation and absees, usually in consequence of irritation of the part from which their lymphatics spring, as in the case of scarlet fever (in which the glands of the throat are affected), in gonorrhea (the glands of the groin), &c. The treatment of such abseesses belongs to the ordinary principles of surgery (see ABSCESS, ADENTIS). A much more troublesome affection of the glands is the slow, comparatively painless, at first dense solid swelling which they undergo in Scrofula (q.v.), which tends very slowly if at all to suppuration and some very slowly, if at all, to supportation, and sometimes remains for years. In Syphilis (q.v.) and Cancer (q.v.) there are also enlargements of the lymphatic glands. Scrofulous or tubercular disease of the mesenteric glands in children constitutes Tabes mesenterica (see MESENTERY). The larger glands, as the liver, kidney, pancreas, spleen, thyroid, thymns, testicle, have all their special diseases, which will be noticed, so far as necessary, in treating of these organs.

Glanvill, Joseph, was born at Plymonth in 1636, entered Exeter College, Oxford, in 1652, and took his degree in duc course, residing afterwards at Lincoln College. The dominant Aristotelianism of Oxford weighed on him almost as heavily as the prevailing Puritan dogmatism of the outer world— he would have breathed more freely in the air of Cambridge, and so have reached the 'new philosophy' of Descartes by a much shorter route. After the Restoration, Wood tells us that he 'turned about and became a Latitudinarian.' 'turned about and became a Latitudinarian.' He took orders, and was appointed in 1662 to the vicarage of Frome in Somerset, which he exchanged in 1672 for the rectory of Street in the same county. Already in 1666 he had become rector of the Abbey Church in Bath, and in 1678 he was installed prehendary of Worcester. He died of fever in 1680, and was buried in the north aisle of the Abbey Church at Bath. Glanvill early succeeded in shelving himself from from religious and example. in shaking himself free from religious and scientific dogmatism, and his famous work, The Vanity of Dogmatizing, or Confidence in Opinions (1661), was a noble appeal for freethought and experimental science. In its second issue (1665) it took the new title of Scepsis Scientifica, or Confest Ignorance the Way to Science, prefixed by a warm panegyrie on the newly-founded Royal Society, of which he had become a fellow the year before (new ed., with

introductory essay by John Owen, 1885). strong sense of the infirmity of human reason was a fundamental axiom in Glanvill's thought; and a fundamental axiom in Glanvill's thought; and a striking corollary to this was his credulity as to witcheraft, seen in his Philosophical Considerations touching the Being of Witches and Witcheraft (1666), and in later books suggested by the doings of the invisible drummer at Mr Mompesson's house at Tedworth, Wiltshire, in 1663. His notions on this subject are seen further in the postlumons Sadducismus Triumphatus, or a Full and Plain Evidence concerning If itches and Apparitions (1681). The book is inductive in the form of its argument, the proof being based on a collection of modern relations, but of course it is based upon a funda-mental misconception of the nature of human testimony. Glanvill maintained that Atheism was begun in Saddneism, and that witches disproved, all spiritual existence vanished with them. superstition was at least a relief from the gross materialism that was the inevitable reaction from Puritan dogmatism; and, if it was really unphilosophical, it was shared by Boyle, Henry More, Baxter, and Cudworth.

Glanvill, RANULF DE, chief-justiciary of England in the reign of Henry II., and author of the earliest treatise on the laws of England, the Tractatus de Legibus et Consuctudinabus Anglia, which was composed about the year 1181. It treats of the forms of procedure in use in the Aula Regis or King's Court, over which he presided, and consists of forteen books. It was first printed in the year 1554; and the best edition, with a translation, of it is that by Sir Travers Twiss (Record Publication, 1890). The treatise closely resombles the Scottish Regiam Majestatem, which, however, it is now generally agreed, is of later date than the Tractatus. Glanvill was born at Stratford in Suffolk, but in what year is not known; in 1175 he raised a body of knights to fight against William the Lion of Scotland, and in 1180 became justiciary of all England. Being removed from this office by Richard I. on his accession, Glanvill took the cross, and died at the siege of Acre (1190).

Glanville, BARTHOLOMEUS DE. See ENCY-CLOPÆDIA.

Glapthorne, HENRY, a minor dramatist in the period of decadence that followed the Elizabethan, of whose life nothing whatever is known save that of whose life nothing whatever is known save that he flourished between the years 1639 and 1643, was a friend of Cotton and Lovelace, wrote a few fair poems and five plays—Albertus Wallenstein, a tragedy; Argalus and Parthenia, a poetical dramatisation of part of the Arcadia; two concidies, The Hollander and Wit in a Constable; and Love's Privilege, a tragico-comedy. Mr Bullen, on dubious internal evidence, attributes to him also The Lady Mother. (Planthorne's dramatic faculty is but Glapthorne's dramatic faculty is but feeble, and it was hardly a kindness to his memory to replint his works (2 vols. 1874), which long encumbered the book-stalls. Nor was it wise of his anonymous editor to try to eke out our slender knowledge of his life by irrelevant and unedifying details about one George Glapthorne of Whittlesca, who need not even have been a relative.

Glarus, a canton of Switzerland, bounded by the cantons of St Gall, the Grisons, Uri, and Schwyz, with an area of 266½ sq. m., and (1880) 34,213 inhabitants, of whom four-lifths belong to the Reformed Church. It is an Alpine region, trenched by the valley of the Linth or Linmat and its lateral vales, and rising in its south-western corner, in the Tödi peak, to an altitude of 11,887 feet. The climate is very severe, and only one-fifth of the land is arable. The rearing of cattle and the manufacture of cotton and woollen goods are the chief occupations of the people. The green cheese called Schabziger is wholly made here, and it and other agricultural products are exported. The constitution is drawn on broad democratic lines. Full freedom of the press, of religion, of industry, and of trade prevails. The capital of the canton is the town of Glarus (5330 inhabitants in 1880), 43 miles SE. of Zurich by rail. It was founded by an Irish monk, Fridolin, in the end of the 5th century. Zwingli was pastor here from 1506 to 1516. Glarus, having been peopled by German settlers, passed after various changes into the possession of the dukes of Austria, but ultimately secured its independence by the victories of Näfels in 1352 and 1388. In 1450 it joined the Swiss Confederation.

Glas. JOHN. Sce GLASSITES.

Glasgow, the industrial metropolis of Scotland and the most populous city in Great Britain next to London, is situated on the banks of the Clyde in the lower ward of the county of Lanark, and overflows in its suburbs into the two neighbouring counties of Renfrew and Dumbarton. Twenty-two miles below is Greenock, where the river spreads out into a great estuary, the Firth of Clyde. It is within a nine honrs' railway journey of London, the distance being 405½ miles, and is about an hour's run (45 miles) from Edinburgh. The city in extent is about 3½ miles from north to south, and the extreme length is 5 miles from east to west, the area of the municipality being 6111½ acres. In reckoning area and population, however, the ring of burghs which have since the passing of the 'Lindsay' Burgh Act sprung up around and almost hemmed in Glasgow ought to be taken into consideration, as these burghs have been formed by the overflow of the population from the city proper, and are thus essentially parts of Glasgow. The population therefore, taking this basis, considerably exceeds 750,000. According to the census of 1881, the inhabitants within the municipal boundaries numbered 511,415, the population of the nine suburban hurghs now existing was then 147,838, and in non-burghal suburban areas flere were 33,069 inhabitants, making a total population of 692,322. The population of Glasgow in 1801 was 77,385, and the increase during this century is greater in Glasgow than in any other European city.

The origin of the name Glasgow is a subject which has been much disputed, and is still at best a mere matter of conjecture. From the position of the original settlement on the banks of the Molendinar, which stream flowed to the Clyde through a dark ravine, it has been argued that the name means 'dark glen.' A more favourite interpretation, however, is based on the fact that a village actually existed on the present site of the city prior to the settlement of Kentigern, and that it was called Cleschu, which name by a series of natural changes in time came to be written Glasghu or Glasgow. This conclusion is probably correct, and admits easily enough of the meaning deduced from it—viz. that in Celtic Glass significs 'green,' and cu or ghu'dear,' thus making the combination Glasgow mean the beloved green spot.

Glasgow does not occupy an important place in the early history of Scotland. As an archiepiscopal seat, and subsequently as a centre of Covenanting activity, it has a prominence in religious affairs; but as an industrial city its history can hardly be dated further back than the Union of 1707. This event opened up to the town—the most favourably situated in Scotland for the enterprise—an immense trading prospect with America, and roused in its inhabitants the extraordinary mercantile activity which has been its leading feature ever since. And yet the city of Glasgow is a very old one. It was

about 560 A.D. that the half-mythical St Kentigern (q.v.) or Mungo established himself on the banks of the Molendinar, and appeared as the apostle of Christianity to the rude Celts of Strathelyde. There he built his little wooden church on the very spot where now rises the venerable cathedral. From this date for five hundred years the history of the settlement by the Clyde is a blank. The church disappeared from history, and if the village which had clustered round it and grown under the place of no inportance. In the year 1115 the Prince of Cumbria, afterwards David I. of Scotland, ordered an investigation to be made into the lands and churches in the bishopric of Glasgow, and from the deed still existing of that date it is evident that a cathedral had been previously endowed. In 1116 the diocese was restored, and when David a few years after became king of Scotland he gave to the sec of Glasgow the lands of Partick, besides restoring to it much of the property of which it had been despoiled. In 1124 he also gifted money for the purpose of building a church, which was dedicated in 1136, and afterwards cariched by many royal and private donations. Between 1175 and 1178 Jocelyn, Bishop of Glasgow, received authority from William the Lion to have and hold a burgh in the neighbourhood of the cathedral. Alexander II. supported Glasgow in a condral. Alexander II. supported Glasgow in a conflict of jurisdiction with Rutherglen, and bestowed on it the rights of trade throughout the kingdom. Robert the Bruce confirmed to the bishop the varihouse charters granted to him, and James II. pro-hibited Renfrew and Rutherglen from exacting toll 'by water or by land' within its territories. In 1450 the city was erected into a regality which gave the bishop the highest jurisdiction the crown could bestow on a subject superior, and within the same year the university was constituted under a bull of Pope Nicholas V., which was confirmed three years later by a letter of privileges from the king and a charter from the bishop and chapter. In 1454 reference is made to one John Stewart

as the first provost that was in the city of Glasgow. After that date the magistrates are described as provost and bailies; and, though it is not recorded how they were elected at that time, in 1476 James III. authorised the ruling bishop in Glasgow to elect so many bailies, sergeants, and other officers as were needed within the city, and to appoint as were needed within the city, and to appoint a provost, all to hold office during his pleasure. This unsatisfactory mode of procedure continued in force till 1587, when the whole of the church lands were annexed to the crown, and several months later granted to Walter, Commendator of Blantyre, in feu for payment to the crown of £500 Scots annually. Along with other privileges, Blantyre and the Duke of Lennox both claimed the right of choosing the property of heilies of the right of choosing the provost and bailies of the burgh, which privilege had been taken from the church. James VI. in 1600 conveyed to Lennox that right; but five years later the city itself was anthorised to have the freedom of election of its own magistrates, and in 1611 this authority was confirmed by act of parliament—not, however, without the stipulation that both the church and Lennox should reserve the right to influence the election. Glasgow therefore did not fully receive the position of a royal burgh till 1636, when it was incorporated into one free royal burgh, with the freedom of the Clyde from the bridge of Glasgow to the Clochstane in the Firth of Clyde. At the time of the Commonwealth the Glasgow citizens made a strenuous effort to effect the union of England and Scotland; but the death of Cromwell and subsequent restoration of Charles II. delayed it, and materially hindered the active trade between the two countries which the policy of the Protector had

inaugurated. The city in 1656 is described as a 'very neate burghe toun—one of the most considerablest burghs in Scotland, as well for the structure as trade of it;' and the same writer commends the

mercantile genius of the people.

As early as 1516 trades in Glasgow were form-As early as 1516 trades in Glasgow were forming into guilds, but it was not till 1672 that the letter of guildry, adjusted in 1605, was confirmed by parliament, which put an end to the perpetual disputes between the merchants' and the trades' guilds. These two classes still exist, the former being represented by the Merchants' House, and the latter by the Trades' House, the heads of which, the dcan of guild and the dcacon-convencr respectively, have been since 1711 constituent members of the town-council. In 1833 all the complicated arrangements in conncction with municipal elections were set aside by the Burgh Reform Act, and the number of councillors in Glasgow was fixed at thirty, over and above the dean of guild and the deacon-convener. Since then the number of magistrates and councillors has increased with the increase of the city boundaries. As constituted in 1890, the town-council has forty-eight members elected by the citizens—three for each of the sixteen wards of the city—with the addition of the dean of guild and the deacon-convener of trades. The council and the deacon-convener of trades. The council elects the Lord Provost, ten bailies, a bailie of the River and Firth of Clyde, and other officers. The city is represented in parliament by seven members for as many different electronal distinguage and the for as many different electoral divisions; and the suburban divisions, Govan and Partick, also each return a member.

The corporation of Glasgow, since it became a popularly elected one, has carried through great operations for the improvement of the city. By its various departments, each controlled by committees from the general council, the lighting, cleansing, water-supply, &c. are administered. connection with the water-supply, the corporation in 1854-59 constructed immense works for a supply of water unequalled in the kingdom, bringing it from Loch Katrine, a distance of 34 miles. The water is conveyed by aqueduct and piping to a reservoir, 70 acres in area, about 7 miles from Glasgow, where it is filtered and distributed by pipes over the city. The converge daily distributed water the city. the city. The average daily distribution now exceeds 40 million gallons. The cost of the construction of these works, including the price paid to the previously existing water companies, has been £2,350,000; and in 1889-90 works were in process of construction at a further expenditure of £1,000,000, for raising the supply of the city to 100 million gallons daily. The valuation of the city in 1855, the first year of the Lands Valuation Act, was £1,362,168; in 1870 it was £2,126,324; and in 1889 it reached £3,401,790.

The lighting of the city also forms one of the municipal departments, the corporation having acquired powers to purchase the properties of the gow and its subnrbs. At the present time over 2300 million cubic feet of gas per annum is supplied to the public: the capital expenditure on the various works amounted in 1889 to £610,000, and the annual revenue is £390,000. Between 1866 and 1890 the town-council as the City Improveand 1890 the town-council as the City Improve-ment Trust spent two millions sterling on objects such as are indicated by its title, and at present that body holds property valued at over half a million of money. Of thoroughfares in Glasgow there are about 200 miles, and the Clyde is within the burgh spanned by ten bridges, of which three are railway viadnets and two suspension bridges for foot-passengers. Parliamentary sanction was obtained in 1889 for constructing a tunnel for foot obtained in 1889 for constructing a tunnel for foot and vehicular traffic under the river at the harbour.

Throughout the city there are upwards of 100 miles of main-sewers, the largest—in brick—being 6 feet in diameter, and the smallest 2 feet.

Of buildings possessing historical interest Glasgow is conspicuously destitute, with the very notable exception of the cathedral, which is a fine example of the Early English Gothic style of architecture. It was begun by Bishop Jocelyn about 1197, to replace the church luilt in 1136 by Bishop John Achains, which had been destroyed by fire. The structure was largely added to by Bishops Bondington and Lander, and was practically brought to its present form by Bishop Cameron in 1446. It was saved from injury in the fit of iconoclastic zeal which followed the Reformation by the activity of the Glasgow craftsmen, and afterwards, from time to time, was carefully repaired by the Pro-testant archlishops who governed the see until the Revolution. The cathedral is in length from east to west 319 feet, and in width 63 feet. It was designed to be in the form of a cross, but the transents were never erected. From the centre rises a tower, surmounted by a graceful spire, 225 feet in height. The most famous part of the feet in height. feet in height. The most famous part of the building is the so-called crypt under the choir, which for elaborate designing, and richness of ornamentation on pillars, groining, and doors, stands unrivalled amongst similar structures in Britain. Properly speaking, however, it is not a crypt, but a lower church formed to take advantage of the ground sloping eastward towards the bed of the Molendinar. About 1854, under the direction of the government, the building was repaired and renewed, its general character being scrupulously maintained. At the same time the ancient tower and consistory house on the west ancient tower and consistory house on the west face of the cathedral were removed. Since then a series of stained glass windows has been provided, mostly by Munich artists.

The city chambers opened in 1889, built at a cost of £530,000, form an architectural feature a cost of £230,000, form an architectural returne of great importance, and occupy a prominent position, filling the east side of George Square. The Royal Exchange, a handsome building ornamented with colombales of Corinthian pillars, contains a newsroom 122 feet in length by 60 feet broad. In the building of churches Glasgow has made great strides during the last thirty years, so that probably no other town in the United Kingdom has done more in this representant the exclesion. has done more in this respect, and the ecclesi-astical buildings of all denominations vie with each other in the elegance of their adonument. The architecture of many of the banks and other public buildings is varied in style and rich in detail, and the post-office buildings, of which the founda-tion-stone was laid by the Prince of Walcs in 1876, though severely plain and massive, deserve mention for their great size and perfect planning. Not without reason, indeed, Glasgow has been called one of the best-built cities of the empire: its streets are well laid out and spacions, and the houses which line them are substantially built of excellent stone which is quarried in abundance around the city.

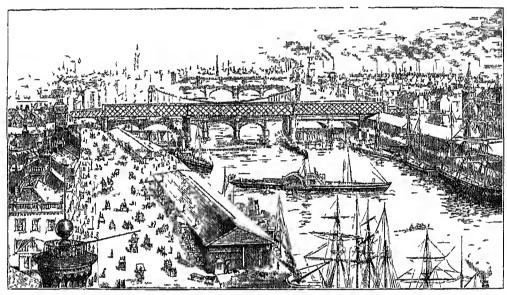
Glasgow is especially well provided with public parks, having three beautifully planned pleasuregrounds in different districts of the city, besides the Glasgow Green—a wide expanse along the north bank of the river—all of which are maintained by the town-council as a Parks and Galleries Trust. The statues in Glasgow are not monerous, though some of them are very fine. The equestrian statue of Wellington stands opposite the Royal Exchange, and that of William III. at the east end of Argyle Street, near the site of the old cross. The greatest number of monumental statues are in George Square, where in addition to the equestrian statues of the Queen and the late Prince Consort are to be found figures of James Watt, Sir Walter Scott, Robert Burns, David Livingstone, Sir John Moore, Loid Clyde (the last two being natives of the city),

and others

The Glasgow and West of Scotland Technical College was formed in 1886 by the amilgamation of several institutions (including the arts department of Anderson's College q v) inder a scheme formulated by the Edic utional Endowments Commission. It his over 2000 students attending its day and evening classes. It provides sinitable education for those who wish to qualify themselves for following any industrial pursuit, and it aims to cheers for technical schools. St Minigo's College, during from 1880, has faculties in medicine and law, and the medical department of Auderson's College is for women. The Prec Church College possesses conspicuous buildings, and mention should also be made of the Normal Schools and of the School of Arts and Haldane's Academy. Of the secondary schools in Glasgow the principal is the High School—a survival of the ancient grunnar school of the city—which is under the manage.

ment of the school board. Other schools of a like standing are the Glasgow and the Kelvinside academies, both large and efficiently managed, while, richly endowed from the Hutcheson Trust, two schools for boys and guls provide at a very low rate a thoroughly good secondary education Scattered throughout all the districts of the town are the elementary schools of the bond, 67 in number, with a technic staff, exclusive of the masters of the High School, of 1314, and scholars on the roll to the number of 61,803, with an average attendance of 84 per cent

Unfortunately, the city is entirely destrinte of fine bindings wholly devoted to library purposes. There is no free lending library in the town, but there are several great collections which may be used free of charge as consulting libraries. Of these the Mitchell Library, which is under corporation management, contains over 75,000 volumes; and the Stuling's and Glasgow Public Library contains about 15,000 volumes. Baillies Library is under the same roof. The university has a library of 175,000 volumes, among which mumber



Glasgow, from the Broomelaw

are many notable examples of Caxton's and Pynson's and other 15th centrity printing, but the library is only available to alumin of the university. The Athenrum includes a new goom, magazine toom, and a library of 12,000 volumes of subscription lending libraries there is an abundance in the city, and private libraries are to be found in such large numbers as to form a distinctive feature. The publishing of books and news papers has of late been more largely developed Glasgow has two duly morning newspapers, three evening, and about a dozen weekly newspapers and periodicals, and one or two monthlies. An industrial industrial nucleum has been instituted in the city in which a considerable collection, especially in the natural listory department, is now displayed. It is supported under the Puks and Gallenes Trust, as are also the Corporation Gallenes of Art, a collection of pictures and statuary acquired partly by purchase, but more largely by donation and bequest. The gallenes contain a very valuable statue of Pitt by Flaxman.

With benevolent and charitable institutions the

etty is nichly endowed. In addition to numerous hospitals and dispensaries for special diseases, there are three general infirmaties, which among them accommodate upwards of one thousand patients. These are the Royal Infirmary in the north east district, the Western Infirmary adjoining the University, and the Victoria Infirmary in the Queen's Park, South Side. They are all main tained by voluntary contributions and bequests.

Three magnificent terminal railway stations bring traffic to the heart of the town, respectively forming the heardquarters of the three great Scotch lines—the Caledonian, the Glasgow and South Western, and the North British St Enoch's Station, the terminas of the Clasgow and South Western, is modelled on the plan of St Paneras, the Central Station is the headquarters of the Caledonian, The Underground Railway (1886), in connection with the North British system, and the City Union line afford every facility for rapid travel ling into nearly every quarter of the town, and in 1889-90 there was under construction an underground system connected with the Cale doman Railway, passing through the busiest and

GLASGOW

most populous districts. Originating with the corporation anthorities, the running of tramears in Glasgow has proved a great success, and there is now throughout the city as efficient a service m this respect as in any other city in the kingdom, while the length of double lines is 31 nules Another means of transit is found in the magnin cent fleet of liver steamers, which are noted for speed, comfort, and elecance of appointment, and afford a rapid and easy means of access to all the Western Highlands and Islands, thus making Glas sow the metropolis of the West Two of the fore most of these 'floating palaces' are the Columba and the Lord of the Isles, the former of which attains a speed of 22 miles an hour, and can accommodate 2000 passengers on its daily journey

The tiver Clyde (q v) has been a chief source of the great prosperity of (disjow, and it is to the ciedit of Glasjow citizens that to their enterprise its utility has been almost elected by the justice while the proposed and deal are too. works of narrowing the channel and diedling so that what within the memory of persons still alive was a stream over which one could wide has now become a channel capable of allowing ships which draw 24 feet of water to ride at anchor The quayage of the harbon and docks from the Broomelaw extends to over 11,000 lineal yields, and the water space covers 1544 acres, while since 1875 two graving docks have been provided cyrible of accommodating the largest increming the strainers affort. On the river and hubban the Clyde Navigation Trust has spent about eleven millions steining and the annual retenue eleven nullions sterling and the annual revenue in 1889 exceeded £300,000, while the enstone terenne of the post amounted to more than \$1,000,000. The principal feature of the Clyde hey and the harbour is the great shipbuilding and maine engineering paids which line its sides, and which has the harbour that when the complexity of the complexity. which have flourished since the second quarter of which have flourished since the second quarter of this century. The proneors of these industrics—the Napiers, Charles Randolph, John Elder, &c—have a world wide fame. They launched from them y uds the most perfect examples of naval architecture and engineering skill of their day, and their successors at the present day amply uphold that reputation by the marvels of naval architecture, such as the Etimua, the City of New York, and the City of Paris. The greatest tonnage hunched in any year on the Chyde was 419,600 in 1883 since that period the normal output has been about 200,000 tons yearly, but in 1889 the tomage 200,000 tons yearly, but in 1889 the toninge built was upwards of 300,000 tons. To the success of the little Comet, the earliest trading stermship in the Old World, which began to ply between clasgow and Greenock in 1812, may be traced the great development of shipbuilding and shipping on the Clyde

But another factor in the industrial prosperity of the city is the fact that it is built over a coalfield uch in seams of monstone. Glasgow is exceptional in having blast furnaces actually within its municipal bounds. It was in the neighbourhood of the city that the first experiments with Neilson's hot blast in non funaces, patented in 1828, were made, and the economy thereby effected developed the non industry so rapidly in Glasgow as to distance for a long period all competition. Great forges, with powerful steam hammers and other appliances, the making of steam tubes, boiler making, locomotate engine building, sugar machinery, and general engineering are among the most important industrial features of the city

Bleaching and calico printing were established in Glasgow in 1738, nearly thirty years earlier than in Lancashne The dycing of Turkeyred was manginated in 1785 as a British industry by two Glasgow citizens, David Dale and George M'Intosh—the colour being known for a long time as Dale's red, and this branch of trade has developed in Glasgow and the neighbourhood to developed in chasgow and the neighbourhood to an extent innequalled in any other manufacturing centre. In Glasgow, also, bleaching powder (chlor ide of lune) was discovered in 1798 by Mi Chailes Temant, who thereby laid the foundation of the algantic 5t Rollox chemical works, and gave the hist impetus to chemical works generally. These, along with the spinning and wearing industries which have been centred in the great city factories since the inventions of Arkwight, Cultwright, and others superseded hand loom wearing, have for the past century afforded employment for a great pro

portion of the population of the town

THE UNIVERSITY OF GLASGOW was founded on 7th January 1450-51 by Bishop Turnbull, who procured a bull of ratification from Pope Nicholas V In 1460 James, first Lord Hamilton, endowed a callege on the site—in the densest put of the High Street—of the late buildings, the older portions of which were erected between 1632 and 1656 (Queen Mary bestowed on the university 13 acres of adjacent ground In 1577 James VI granted increased funds in a new charter In 1864 the university buildings and adjacent lands were sold for £100,000, and liandsome new buildings, designed In Strototo, and handsome new outdains, designed his Strot West End Park, and opened in 1870. The total cost was about £470,000, of which £120,000 was granted by parliament, and above £250,000 subscribed and otherwise obtained, ehieth in (disgom For the election of a common half the Mirgus of Butc give £40,000, v bequest of £60,000 by Charles Randolph was utilised in completing the buildings, £5000 bequeathed by Andrew Cimminghame went to complete the spine in 1888, and a students' union was elected by Di Wintige, and opened in 1888, at a cost of union M'Intrie, and opened in 1888, at a cost of more than £5000

Chair, Office bearers, Degrees —The office bearers of the university consist of a Chancellor, Rector, Chair, Office bear et s. Despeces.—The omee bearets of the innversity consist of a Chancellor, Rector, Principal, and Dean of Faculties. The chancellor holds his office for life, and was formerly elected by the senate, but since 1875 he is elected by the general council, the rector is elected trienmally by the matriculated students, who are divided, according to their place of brith, into four nations—Glottuna (Lanakshne), Transforthama (Scotland north of the Forth), Rothscanae (Buteshne, Renfiewshne, and Ayrshne), Toudonanae (all other places). In the university there are four faculties. Arts, with 10 chairs, Drimity, having 4 chairs, Law, represented by only 2 chairs and 2 lectureships, and Medicine, to which is attached 12 chairs, besides lectureships. The degrees granted are Master of Arts (M.A.), Bachelor of Science (B.Sc.), Doctor of Science (D.Sc.), Doctor of Medicine (M.D.), Master of Surgery (C.M.), Bachelor of Divinity (B.D.), Bachelor of Laws (B.L.D.), the last two being homorary. The university also grants certificates as Literates in Arts (L.A.) to candidates who have attended two sessions, and certheates of have attended two sessions, and certificates of various grades to women and students not attending tions, besides which it has instituted a diploma for teachers. The number of matriculated students in 1870-71 was 1279, in 1888-89 they numbered 2104, of whom there were in the Faculty of Arts 968, Theology, 92. Medicine, 784, and Law, 194 The Theology, 92, Medicine, 784, and Law, 194 The students reside outside the college walls, and those in certain classes of the Faculty of Aits wear scallet gowns. The university, conjointly with that of Aberdeen, returns one member to parliament.

But saires and Exhibitions.—There are inpeared force.

of 300 bursanes for students still attending lectures,

ranging in value from £6 to £80; and with exhibitions, fellowships, and scholarships (besides 9 common to Glasgow with the other Scottish universities), the amount distributed yearly exceeds £8000. Of the latter the most valuable are the four Clark scholarships, founded in 1872, and each worth £200 a year. The oldest are the Snell exhibitions, founded by John Snell, a native of Ayrshire, who in 1677 presented to the university a landed estate, for the purpose of supporting at Balliol College, Oxford, ten students who had previously studied at Glasgow. Owing to the rise in the value of land, the foundation was made to maintain 14 exhibitioners, who were each to receive £110 a year for five years; but at present the yearly stipend is only £80, with an arrangement that the total sum, £400, may be paid within three years. Several men who have risen to great eminence went to Oxford on Snell exhibitions; among whom may be named Adam Smith, Sir William Hamilton, Archbishop Tait, Principal Shairp, and Lord President Inglis. Libraries, Museums, &c.—The library was founded

Libraries, Museums, &c. — The library was founded prior to the Reformation, and now contains about 175,000 volumes. It is supported by an annual grant of £707 from the Treatury, graduation fees, the contributions of students, &c. Subsidiary libraries are attached to several of the classes, the books being selected with a view to the subjects treated of in each class. In July 1781 the celebrated Dr William Hunter of London framed a will, leaving to the principal and professors of the university his splendid collection of books, coins, medals, and anatomical preparations; and for the accommodation and conservation of these a building was erected in 1804; but they are now located in the new university. The university also possesses an observatory, and has certain rights in Glasgow botanical garden; and several of the professors have collections of apparatus attached to their classes, illustrative of the courses delivered.

Eminent Professors and Students.—Among the men of eminence who have taught or studied in the university are Bishop William Elphinstone, John Major, John Spottiswoode, Andrew Melville, James Melville, Robert Boyd of Trochrig, John Canneron, Zachary Boyd, Robert Baillie: James Dalrymple, first Visconnt of Stair; Gilbert Burnet, Bishop of Salisbury; Dr John Donglas, Bishop of Salisbury; Dr Robert Simson, Francis Hutcheson, Dr William Hunter, Tobias Smollett, Dr John Moore, Dr Adam Smith, Dr Thomas Reid, Dr William Cullen, Dr Joseph Black, Dr Matthew Baillie, Thomas Campbell, Francis Jeffrey, John Gibson Lockhart, Sir William Hamilton, Sir Daniel Sandford, and Archbishop Tait.

See John M'Ure, A View of the City of Glasgow (Glasgow, 1736); John Gibson, The History of Glasgow (8vo, Glasgow, 1779); Andrew Brown, History of Glasgow (2 vols. 8vo, 1795-97); James Cleland, Annals of Glasgow (8vo, 1829); Dr Gordon, Glasghu Facies (2 vols. 8vo, 1872); Andrew MacGregor, The History of Glasgow (8vo, 1881); George MacGregor, The History of Glasgow (8vo, 1881); Andrew Wallace, Sketch of the History of Glasgow; also Glasgow Past and Present, by 'Senex' and others (8vo, 1882; 3 vols. 4to, 1884).

Glass (Anglo-Saxon glas) is essentially a combination of silica with some alkali or alkaline earth, such as lime, barytes, &c. Generally speaking, it is understood to be a silicate of soda, or a combination of silica or flint with one or more of the salts of sodium, with the addition of certain metallic oxides. &c., as explained on page 239

oxides, &c., as explained on page 239.

History.—The invention of glass dates from the earliest antiquity, and the honour of its discovery has been contested by several nations. As the oldest known specimens are Egyptian, its invention may with great probability be attributed to that people. It is mentioned as early as the 5th or

6th dynasty, about 3300 B.C., and called bashnu, the Coptie bijni; articles made of it are represented in the tombs of the period; while its fabrication is depicted in sepulchres of the 12th dynasty—i.e. about 2500 B.C. The glass of Egypt was generally opaque, rarely transparent, and always coloured, the articles made of it being of small size, and principally for adornment, as beads, vases, small figures, and objects for inlaying into wood or other material. Specimens exist of this glass bearing the name of the queen Hatasn of the 18th dynasty, and vases of blue glass, with wavy lines in white, light-blue, yellow, black, red, and green, of that and a later age, have been discovered. The Egyptians also successfully imitated precious and other stones in glass—as emeralds, lapis-lazuli, turquoises, jaspers, onyx, and obsidian. Transparent glass, indeed, does not appear earlier in Egypt than the 26th dynasty, about 660 B.C., when bottles and a few other objects were made of it.

Under the native Pharaohs, Egyptian glass seems to have been extensively exported to Greece and Italy, and its reputation still continued under the Ptolemies, when the furnaces of Alexandria produced glass vases of numberless shapes and considerable size. Egypt retained the pre-eminence in the manufacture of glass under the Romans, the sand of Alexandria being indispensable for the finest qualities, and it exported glass to Rome. Hadrian, on his visit, was struck with the activity of the manufacture, and sent to his friend, the Consul Servianus, one of the vases, called allosontes, or 'opalescent;' and the Roman writers mention with admiration the melting, turning, and engraving of Egyptian glass. The art of glass-making, in fact, has never become extinct in Egypt, the Fatimite Califs having issued glass coins in the 10th and 11th centuries, and beautiful lamps of glass enamelled on the surface with various colours having been made in the 14th centurity.

colours having been made in the 14th century.

After the Egyptians, the people of antiquity most renowned for glass were the Phomicians, who were its legendary inventors. Certain of their merchants, says Pliny, returning in a ship laden with natron or soda, and having been compelled by stormy weather to land on a sandy tract under Mount Carmel, placed their cooking pots on lumps of nation on the sand, which, fused by the heat of the fire, formed the first glass. This statement, in-troduced by Pliny himself with fama est, points only to the great antiquity of the art among the Phenicians, for the occurrence is a simple impossibility. Sidon, indeed, was early celebrated for her glass-wares made of the sand brought down from Mount Carmel to the mouth of the river Belus. The nature, however, of the earliest Phoenician glass is unknown, unless the opaque little vases of the toilet found in the tombs of Greece and Italy, and the beads of the same discovered in the barrows and tunnili of the old Celtic and Tentonic tribes were imports of the Phonicians. It is certain that at a very early period the manufactures of the Phonicians were widely distributed over the Mediterranean coast, and even reached the shores of Britain, where they were exchanged for the mineral wealth of Cornwall. The vases of Sidon were highly estcemed at Rome under the Antonines, fragments of bowls of blue and amber glass, with the names of the Sidonian glass-makers, Artas and Irenœus, stamped in Latin and Greck, having been found in the ruins.

From these two centres, Egypt and Phoenicia, it is probable that a knowledge of the art radiated, and was transplanted into neighbouring countries with the growth of civilisation. The manufacture, it might be inferred, was early established in Assyria, for in his excavations at Ninrud Mr Layard unearthed with other glass remains a vase

of white glass having stamped or inscribed on it a lion and the name of Sargon, who reigned 722 n.c. But this specimen may have been brought from



Fig. 1.—Glass Vase, bearing the name of Sargon, from Nimrud.

Sidon; and other fragments of glass brought by Layard from the same place are Roman in form, and certainly belong to the period when Romans the there established their colony of Clandiopolis. In Greece the knowledge and use of glass were by no means ancient. In the days of Homer it was nnknown. Herodotus, indeed, mentions its employment for earrings, but these may have been of Phonician fabric. It was called hyalos, crystal or ice,

and lithos chyte, or fusible stone. Aristophanes, 450 B.C., mentions glass or crystal vessels, and various inscriptions confirm its use; but its value was next to gold, which could hardly have been the case if it had been of native manufacture. In the 4th century B.C. Pausias, a celebrated painter, had depicted Methē, or 'Intoxication,' drinking from a transparent glass bowl which revealed her face. Glasses and plates, amphore and diote, large two-handled jars, were made of it, and also false stones for finger-rings, called sphragides hyddinat. These last, called by archeologists pastes, were imitations of engraved stones in coloured glasses, used for the rings of the poorer classes, and were no doubt often copies or impressions of engraved stones of celebrated masters. False gems and cameos having a subject in opaque white, sometimes like the sardonyx, with a brown layer superposed on the parts representing the hair, and the whole laid on a dark-blue ground, appear before the Christian era. Lenses also were made of glass, and the celestial sphere of Archimedes was made of the same material.

Among the Romans the glass-making art does not date earlier than the commencement of the empire, importations from Sidon and Alexandria having previously supplied the want of native manufacture; but there is ample evidence of its extensive manufacture at that period. As early as 58 B.C. the theatre of Scaurus had been decorated with mirrors or glass plates disposed on the walls. Glass was also used for paving, and for the blue and green tessers of mosaics (see Mosaic). Window-glass does not appear to have been much window-glass does not appear to have been minch used till about the 3d century A.D., the houses at Herculaneum and Pompeii, destroyed in the reign of Titus, being glazed principally with tale; but remains of glass-filled windows have been discovered in both cities, showing that its employment was at least begun in the 1st century. Lactantius, in the 3d century, and St Jerome, in 422 A.D. mention glass windows. Olderwindows of 422 A.D., mention glass windows. Older windows of this material are said to have been found at Ficul-nea, and even in London. Under the Romans, coloured as well as white glass was extensively used; it had a greenish tint in the first days of the empire, but had sensibly improved in colour and quality in the days of Constantine. The first production of a white glass like crystal, probably much freer from air cavities and other imperfections than had previously been accomplished, was in the days of Nero. Its use was most extensive, and it was either blown or stamped according to the objects required. Glass vases, vasa vitrou escaria potoria, are mentioned. So are costly cups of many colours, purple ones of Lesbos, and balsamarii, especially the kind long called lachrymatories, which held perfumes, medicine, drugs, and other substances like modern vials, amphore, ampulke, pillar-moulded bowls, bottles for wine (lagena), urns (urna) for holding the ashes of the dead, and pillar-moulded bowls or cups (pocula), hair-pins, beads, rings, balls, draughtsmen, dice, knucklebones (astragali), mirrors, multiplying glasses,



Fig. 2.—Moulded Glass Roman Cup, with the Circus and Gladiators, found in London.

prisms, magnifying-glasses, and water-clocks were under of this unaterial. Most of the precious stones were successfully initated in glass pastes; and the Empress Salonina was egregiously cheated by a frandulent jeweller. But the most remarkable works in glass are the cameo vases (forumata vitri); of which the most celebrated is the Portland Vase (q.v.) in the British Museum, which seems to have held the ashes of a member of the imperial family of Alexander Severus, who died 235 A.D. A vase of smaller size, but of similar fabric, with arabesques, found at Pompeii, exists in the Naples Museum; and numerous fragments of even finer vases, some with five colours, exist in different museums. In the reign of Tiberins an adventurer pretended that he had invented flexible glass, and threw down a vase which only bent, and which he readjusted with a hammer; he seems to have connected it in some way with the philosopher's stone, and the emperor is said to have banished him or put him to death. In the 3d century A.D. appeared the diatrêta or 'bored vases,' consisting of emps (pocula) having externally letters and network almost detached from the glass, but connected by supports; all which must have been hollowed out by a tool, involving great labour. One vase of this class, bearing the name of Maximianus, who reigned 286-310 A.D., found in the vicinity of Strasburg in 1825, and preserved in that city, fixes their age. At a later period bowls of engraved glass, laving subjects of gladiatorial fights, came into use. Still later, apparently in the 5th century, a new style of glass ornamentation was introduced, consisting of the figures of Christ and legends of saints, and the potraits of private persons laid on in gold upon one layer of glass, over which was placed another through which they appeared. While the art of glass-making declined in Rome with the deax age; the empire, its practice was transferred to Constantinople, and there it continued to flowish under the Eastern Empire throughout the dark ages; the

as Byzantine. The Byzantine manufacturers became specially famous for the production of glass mosaics; and throughout the middle ages there are many notices of mosaic decorations derived from Constantinople. From the Byzantines the Arabs obtained a knowledge of glassmaking, and 'glass of Damaseus' attained celebrity in medieval times through the numerous examples brought to western Europe by Crusaders.

It is nost probable also that the great centre of the glass industry of medieval and more recent times, Venice, received its early impulse and lessons from Constantinople. The art began there with the beginning of the city in the 7th century A.D.; but it experienced a marked improvement after the conquest of Constantinople in 1204, and in 1291 the establishments were removed to the island of Murano, the manufacturers forming a guild with a Libro d'Oro, or register of nobility, and guarding their secret with the greatest jealousy. In 1436 their colonr-glass came into note, and continued so till the close of the century; and in the 16th century lace-patterns and mirrors were introduced. In the 15th and 16th centuries plain glass with tasteful ornaments gilt and enamelled; in the 16th, crackled lace and reticulated glass, vitro di trino; and in the 17th century variegated or marbled glasses were produced. The

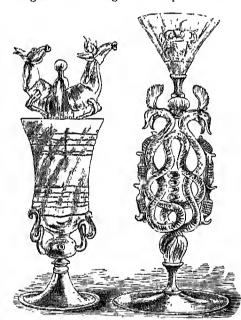


Fig. 3.—German Drinking-glass.

man Fig. 4.—Venetian Glass on open-work stem.

millefiori glass extends through all periods, and seems to have been derived from the Roman, being continued to the present day, when large quantities of this glass in the form of beads are annually imported to England, and transported to Africa and Asia in the way of trade. The Venetian glass enjoyed for a long time the monopoly of commerce, the mirrors, goblets, and cups being exported all over the world, and within recent years there has been a marked revival of the skill and enterprise of Venetian craftsmen. The forms of the Venetian glass reflected its oriental origin, and the earlier glass of other countries of Europe in turn shows the derivation of their art from Venice. In Germany the oldest glass (which was flint) dates from the 16th century, and consists of goblets and tankards

of white colour, enamelled with coloured coats of arms and other devices, nillefiori, and schmeltz glass. Engraved glass was first introduced by Caspar Lehmann at Pragne in 1609 under imperial protection, and continued by his pupil G. Schwanhard; and ruby glass by Kunckel in 1679. Glass is said to have been made in 1294 at Quinquengrone, in Normandy, and a common kind was made later in Danphine and Provence. In 1665 twenty Venetian glass-workers were brought by Colbert to Paris, where they set up the blowing of glass and the silvering of mirrors, the famous mirror hall in Versailles having been furnished by them. In 1688 an exclusive privilege of making large plates of glass by easting was conferred on Abraham Thevart. It has been discovered that the name Thevart was assumed by a syndicate of capitalists formed to develop and work the invention of Louis Lucas de Nehon, who was the real inventor of plate-glass and the founder of the Gobain works—to this day one of the most extensive plate-glass works in the world. In 1865 there was placed a memorial over the door of the chapel of Gobain with the following inscription: 'Louis Lucas de Nehon inventa en 1691 la methode de conler les glaces, et installa la manufacture, en 1695, dans le château de Saint Gobain, ou il est mort, en 1728.' In France, oxide of lead flint-glass was made at St Cloud in 1784; another maunfactory was subsequently established at St Louis in 1790; and the St Cloud establishment was removed till 1827.

It is uncertain whether glass was made in England before the 16th century, as that mentioned may have been imported from Flanders or Venice. In 674 Benedict Biscop introduced makers of glass windows into Northumbria; but window-glass was not in general use for windows till the 15th century. In 1557 flint-glass was manufactured at the Savoy and Crutched Frians; in 1555 there were glass-works under Cornelius de Lannoy; and in 1567 Jean Quarre and other Flemish manufacturers established works at Crutched Frians, which Quarre's descendants extended to Sussex. In 1615 Sir R. Maunsell obtained a patent for making glass, in consideration of using pit-coal instead of wood, and oxide of lend was then introduced in 1635; and in 1673 Venetian artists, brought over by the Duke of Buckingham, manufactured mirrors of plate-glass at Lambeth, and drinking-glasses were made at this period. But Venetian glass was extensively imported. In 1771 the company of British Plate-glass Manufacturers was established at Ravenhead, near Prescot, Lancashire. Patent plate, which consists of fine sheet-glass polished, was first made by Messrs Chance of Birmingham in 1840. In Scotland the manufacture was introduced in the reign of James VI., and George Hay obtained a patent for thirty-one years. The first glass was manufactured at Wemyss, in Fife, afterwards at Prestonpans and Leith. In 1661 only the principal chambers of the king's palace had glass. In America attempts seem to have been made to establish glass-works at Jamestown, Virginia, in 1608–22; at Salem, Massachusctts, in 1639–40; in New York city before 1664; and in Pennsylvania before 1683. Subsequently works were established in 1780 at Temple, New Hampshire; in 1792 at Boston; and in 1797 at Pittsburg. Plate-glass was first made there in 1853, and it is also made at Baltinore and New York.

At an early period the application of glass for magnifying lenses appears to have been known. Ptolemy II. had a telescope mounted at the Pharos, and globes filled with water were in use for the purpose of magnifying under the Romans. Lenses are mentioned in the 12th century A.D. by Alhazan,

and by Roger Bacon in the 13th century; towards the close of which Salvino d'Armato invented everglasses, which were subsequently improved by Ales-andro Spina. Glass-reflectors for telescopes, of great size and accuracy, have been made in

France (see TELESCOPE).

As regards processes of making, that called the cylindrical was used by the ancients, and is mentioned by Theophilus at the end of the 12th century. The rotatory process was first introduced in Bohenia, subsequently into France in 1730, but not into England till 1832. Pressed glass was invented in America. In England there were twenty-four window glass factories in 1847, and only seven in 1866. In 1889 there were in the United Kingdom 43 manufacturers of flint-glass, onited Kingdom 43 maintracturers of finit-glass, 4 of sheet, 4 of polished plate glass, 7 of rolled or rough plate-glass. The value of the export of glass from Britain increased from £26,694 in 1848 to about £500,000 in 1855; in 1887 it was £1,021,029, and in 1888, £1,109,341. The value of the foreign glass of all kinds imported in 1857 was £1,671,268 and in 1888 was £1,008,770. In 1869 the £1,674,268, and in 1888 was £1,006,770. In 1880 the glass manufacture of the United States gave work to 211 establishments, employing 24,177 hands. Of the total product, with a value of \$21,154,571, over two-lifths were made in Pennsylvania, and nearly an eighth in New Jersey. The export of glass and glassware had in 1886 a value of \$773,878, in 1887 of \$883,504. The imports had a value of \$7,301,340 in 1887.

Manufacture.—In its ordinary state, glass is a solid body with a characteristic lastre called vitreous, and a conchoidal or shell-like fracture when ous, and a concluded of site of some thickness; further, it is more or less bittle, a property which arises from its outer and inner molecules cooling from a state of fusion at a very unequal rate. It is usually said to be amorphous, but perhaps it rather represents a stage between the perfectly amorphous and the crystalline states. A tendency in his glass to crystallise in couling is one of the things a glass-maker dreads. Glass is commonly transparent, although this property is not an essential activities at the collections of the control of the control of the collections. transparent, although this property is not an essential one, since a true glass may be almost opaque, or at most transluceut, even when very thin. Glass when softened by heat is highly tenacions, and may be easily moulded into all conceivable shapes; it welds when red-hot; at a lower heat it is plastic, and may be cut with knives and scissors; when cooled it is usually quite brittle. But molten glass can be rapidly drawn out into long threads hundreds of feet in length, and such threads retain when cooled sufficient flexibility to be woven into a beantiful silky fabric. a beantiful silky fabric.

The chemical composition of glass differs with the different kinds. It is essentially a silicate of some sods or of potash combined with a silicate of some alkaline earth or other basic body, such as the oxide of lead. Silica with potash or soda alone, or with both, forms a soluble glass unfit for windows or vessels of any kind. The following table gives

the composition of the chief kinds of glass:

Window-glass, including crown, sheet, and plate: silicate of soda and lime.
 Bohemian Crystal-glass: silicate of potash and lime.
 Flint-glass, often called crystal-glass or simply crystal: silicate of potash and lead.
 Bottle-glass—that is, of the common kinds: silicate of lime and shungar. with smaller quantities of the

lime and alumina; with smaller quantities of the silicates of potash or soda, iron and manganese; the silicates of baryta and magnesia being also frequently present.

There are some other kinds made on a more limited scale, such as optical glass, strass, and enamel glass. Any of the above kinds of glass may be coloured by the use of certain metallic

Raw Materials.—For the better kinds of glass these are the following: Silica, employed chiefly in the form of sand, of which an abundant supply, sufficiently free from iron for ordinary window-glass, is to be found in England. For the best qualities of plate and flint glass, in which purity of colour is essential, manufacturers have recourse to the sands of France and Belgium. Potash, as pearl-ash, or wood-ashes, or the sulphate of potash. Soda, in the form of carbonate or sulphate of soda. Line, in the state of caustic line, chalk, or or dinary limestone, if sufficiently pure. Baryta, from heavy spar or witherite; but barium compounds are as yet only to a limited extent employed. Lead is safest used in the form of red-lead (peroxide), a quality free from copper, which would impart colonr, being specially made for glass-makers. *Carbon*, in the form of charcoal or powdered anthracite coal, for the decomposition of the alkaline sulphoto. phates. Cullet or broken glass of the kind intended to he made. All the above materials must be as free as possible from iron or other impurities when colourless glass is required; and, in order to prevent any iron or carbon present from tinging the glass, small quantities of oxidising agents, as nitre, glass, small quantities of oxidising agents, as nitre, arsenions acid, and peroxide of manganese, are also employed. Bottle-glass is made of comparatively coarse materials, as will be presently seen.

Glass Pots, or Melting-ressels.—These require to be very carefully made of some very refractory clay, since the cracking of one in the furnace, which constitutes the restriction of the furnace,

which sometimes happens when it is newly put in, is a considerable loss to the manufacturer. In Great Britain the famous Stourbridge fireclay is nearly always used for them. It is almost wholly composed of silica and alumina with water, and is nearly free from oxide of iron or other easily fusible nearly free from oxide of iron or other easily fasible ingredient. Much attention is given to the preliminary preparation of the clay, called tempering. It is then put into large eisterns, mixed with water, and kneaded with the naked feet, which renders the clay of a uniform consistency and free from air cavities; but it requires to be turned over and kneaded repeatedly. After a week or two, it is removed to large tables, where it is mixed with the ground fragments of old pots, and carefully worked into a plastic mass. This prepared clay is next made up into small rolled pieces, with which the pot-maker slowly lutilds up the pot, adding only a made in the small rolled pieces, with which the pot-maker slowly limited up the pot, adding only a few inches to its height in a day. Foreign pots are made in moulds of thick wood strongly hooped with iron, but in England entirely by hand. The pots are usually kept several months in stock, after which they are

annealed by being kept for a few days at a red heat, in which state they are trans-ferred to the glassfurnace for use. New pots require to be 'glazed' throwing in quantity of by

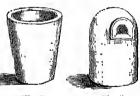


Fig. 5.

broken glass, which protects them from the further action of the materials used in glass-making. Fig. 5 represents a pot for window or bottle glass, and fig. 6 a flint-glass pot, which has always a covered

Furnaces.—The furnaces which have been long in use for its different kinds will be noticed in turn as we describe the processes of making glass; as, however, the Siemens furnace has come into extensive use in various departments of the glass manufacture, it is necessary to give an idea of its construction. A general description of this furnace is given under Inon; but we give here a plan (fig. 7),

and a cross section (fig. 8)—the latter showing the brick regenerators—of that form of it called the continuous tank furnace in which no pots are used—a form which is now largely employed in making bottle-glass, rolled plate, and sheet-glass. For most kinds of glass pots are still used in the

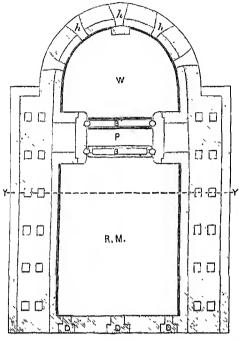


Fig 7.

Siemens as well as in the older kinds of furnaces; where pots are preferred, the chief difference is that a flat platform is prepared for their reception, instead of the bed of the furnace being in the shape of a tank or eistern.

The figures are to some extent rather diagrams

than exact representations of the finnace, since, otherwise, more woodcuts than we can find room for would be required to explain it. In the plan (fig. 7), RM is the compatment into which the raw materials are fed by the doors, D. When the glass is partially melted, it passes under the first floating bridge of ficelay, B, which keeps back floating impurities. In compartment P the glass is completely melted, and it then passes in a pune state under the second floating bridge, B', into the compartment W, where it is ready for use; h, h, h being the working holes. The space under RM in fig. 8 is an airflue for the purpose of keeping the tank cool. In the section (fig. 8), A and G represent the air and gas regenerators on the left, and A' and G' the corresponding ones on the right. The gas-producers are not shown, but, as explained under IRON, the air and gas are fed for a certain

time through A and G respectively to the bed of the furnace; and, while this is the case, the products of combustion descend through A' and G' on the right, by which the piles of open brickwork

become in time highly heated. By a proper arrangement of flues and valves, this process is then reversed, so that the gas and an now enter the furnace on the right, robbing in their comes the hot bricks in A and G of their heat, and carrying it back to the bed of the furnace. This time, of course, the products of combustion escape through A and G on the left, by which these regenerators become in turn heated, thus saving heat which is lost by escaping up the chimney in ordinary furnaces. In a subsequent specification Messis Siemens replaced the fixed partitions by bars or girders of fireday or other refractory material, which float transversely on the surface of the molten matter, the upper stratum of which they divide into compartments. The partially melted material is thus kept at the supply end of the tank, and only the more thoroughly melted and purer matter is permitted to flow towards the working end under these floating bridges. More recently partitions, whether fixed or floating, have been for the most part dispensed with, and the tank forms one lings, long basin. Floating vessels made of pot-clay, divided into three compartments, or two compartments and a floating ring, do the work of separating the refined from the curder matter.

Bottle-glass.—The tank furnace, without bridges,

Bottle-glass.—The tank furnace, without bridges, to which reference has just been made, is admirably adapted for the manufacture of bottle-glass, and has superseded the system of melting in pots. In the composition of this glass a great variety of materials is admirable in conjunction with sand, which forms the basis of this as well as of all other kinds of glass. The residual alkaline and calcic salts from gas, soap, and alkali works, sulphate of soda, clay, common salt, chalk, basalt, and other rocks containing felspar, and lastly the slag from inon blast-furnaces are the materials chiefly in use. When the glass is properly melted and skimmed, a workman dips a long iron tube called a blowpipe into a pot or tank and takes up (on repeating the operation) a 'gathering,' or sufficient metal to make a bottle (a, fig. 9). Another workman brings this into a pear-shape (b, fig. 9) hy slightly blowing and tunning it on a stone or iron table, called a marver. Formerly the further manipulation of the bottle was done by hand, but moulds are now used. These are usually of cast-iron or

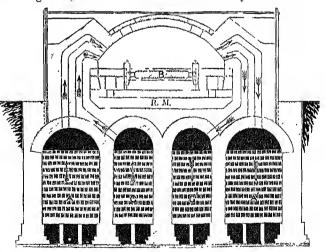


Fig. 8.—Cross Section on YY, fig. 7.

biass, or sometimes of clay, and open or close by the piessire of the foot on a spring. Into such a mould the partially-distended glass is inscribed, and made to fill it by blowing down the tube, the

bottom being pushed up with a pontil, and the ring nound the mouth afterwards made by the addition

of a strip of metal

Annealing—When the glass-blower has finished a bottle, it is immediately taken to the annealing oven, where it remains for some thirty six homs, during which time it cools very gradually from almost a softening heat to the ordinary tempera-ture of the air. This process is a very important one in the manufacture of all kinds of glass, hecause when newly made into vessels or sheets it is so fragile that it will searrely endure touch-The molecules are then under a strain from the outside portion of the glass cooling much quicker than the inner; but this is in a great measure rectified by annealing it, and so a proper strength is acquired.

Window-glass .- Crown and sheet glass are the very same in respect to composition, and plate-glass only differs from them in that the proportion of lime is usually less, and the materials more careof thic is testify less, and the interials more carefully selected with regard to purity. In England sheet-glass is made from mixtures of which the following is an example. Sand, 100; snlphate of soda, 40 to 45; chalk or limestone, 40; powdered anthracte coal, 2; cullet, 100; small quantities of those bleaching or oxidising agents already noted being added as required.

noted being added as required.

Crown-glass.—Before the repeal of the duty on glass in 1845 this glass, then almost the only kind gass in 1945 and gass, then and state only knot used in England for windows, sold at £12 per crate, from which puree it had fallen in 1865 to £2, 8s. Its manufacture is now practically given up in favour of sheet-glass, at first called German or Bohemian sheet, the price of which has fallen in a like degree. Crown-glass being in large circular discs, much waste is caused by cutting these into rectangular pieces, and by the thickened lump or bull's eye in the centre of the disc. In past days these objectionable hull's-eye pieces were stack into cellar-windows, and it is not a little curious that these are now being made, though of smaller size and in coloured glass, in large numbers for ornamental windows.

The metal being brought to a workable condition and skimmed, a sheet of crown-glass is made in this way: A workman, by dipping his

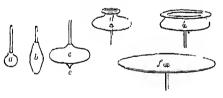


Fig 9.

long iron blowpipe two or three times into the pot, takes up on the end of it a gathering of about 10 lb. of metal, which, when the pipe is held upright, lengthens by its own weight into a bulb shape (a, fig. 9). Rolling this on the marver, the workman makes the outer potton conical, and then, by blowing, forms it into a pear shape (b, fig. 9). Further heating and blowing brings it into the shape of a flattened sphere, and to a much the shape of a flattened sphere, and to a much increased size (c, fig. 9), with a point c' called the bullion point.

At this stage the glass is transferred from the blowing pipe to an iron rod (ponty), on the end of which a lump of hot iron metal has been placed. This lump is made to assume the form of a little cup by pressing it on an iron point, and is then pressed against the bullion point of the flattened sphere, to which it becomes firmly attached. The pipe is detached by means of a piece of iron dipped in eold water (d, fig. 9). The globe of glass is now held with the ponty. The operator next earries it to the nose-hole, and presents the opening formed by the detachment of the blowpipe to the action of the furnace; this again softens the glass, which is then taken to the flashing furnace, and kept continually revolving, by turning the ponty on a rest in front of the furnace opening. The revolutions in front of the funace opening. The revolutions are at first slow, but are gradually accelerated as the softening of the glass goes on, and the centrifugal force so produced throws the edges of the oilice outwards, as in c, fig. 9. As the glass flattens, it is revolved with greater rapidity, and advanced so near to the month of the furnace as to draw the flames ontward, by contracting the draught. This completes the softening of the glass; it then opens suddenly, with a rushing noise like the unfuling of a flag in the wind, caused by the rapid flying outward of the softened glass and the rush of the flames outwards. It becomes perfectly flat, and of equal thickness, except at the bullion or centre (f, fig. 9). The flashing is now complete: and after being detached from the ponty, it is taken to the annealing oven, mto which it is passed through a long horizontal slit which forms the opening, and when fairly in, it is deviceously turned on its edge. Here it remains at a temperature somewhat below that required to soften glass, until the oven is filled with these so-called where edges. called tables of glass, when the heat is suffered to decline, until the whole is cold, when they are removed to the packing-room, to be packed in crates for sale.

Sheet or cylinder glass, as already stated, has new almost entirely displaced crown glass for windows. The Bohemian process, at present practised, was introduced from France in 1832, although a very rude kind of sheet glass had been previously made in England. Sheet is made in a quite different way from crown glass, masmuch as a long and perfect cylinder is sought to be produced by the blower instead of a sphere of glass. Very much larger sheets can be obtained by this than by the enown-glass process, as the form is rectangular and there is no lump in the

centre. In some works the largest sizes are made with the aid of a mechanical apparatus for swinging the cylinders, called an 'iron man.' Fig. 10 shows a ground-plan of an eightpot firmace heated by gas. The gas and air are supplied through the five apertures, ealled 'ports' (three for gas and two for air, or vice versa), which are placed at oither end of the furnace, below or on a level with its bed, each end forming the entrance and exit alternately (vide description of the reversing system, fig. 8). This is the furnace originally designed by Messis Siemens, and adopted by Messis Chance in 1861. Since that period the paten-

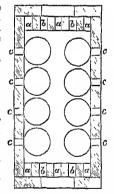


Fig. 10. , apertures for entrance of gas; b, apertures for entrance of air; c, work-ing holes over pots

tees have introduced various modifications, but it is questionable whether they have improved upon their original design. In very long funaces it is better to place the ports between the pots, and in a line parallel to the sides of the funace. In this system the pots are heated partly by the direct action of the flame, and partly by radiation from the crown of the furnace. In his latest specifications Mr F. Siemens has taken a new

departure, and introduces the gas and air at a considerable height above the pots, the heat being thus obtained entirely by radiation. This arrangement is applicable to tanks as well as to pot furnaces. Fig. 11 shows the system of heating by radiation as adapted to a long furnace

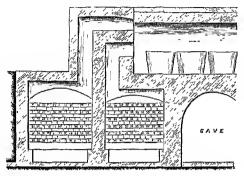
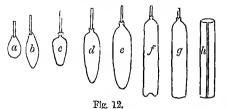


Fig. 11.

holding, say, 30 pots; for a shorter furnace the arrangement is modified, the pots and tho ends of the furnace being enreed. The workman, having made his gathering (a, b, fig. 12), forms it into a cylindrical mass of the diameter required by blowing and turning it in the cavity either of a solid block of wood which is sprinkled with water, or of a hollow metallic block which is kept cool by water passing through it. By more blowing and swinging over the head, the workman brings it by degrees nearer to the form of an clongated cylinder (e, d, fig. 12). As it cools rapidly in this operation, he from time to time places his pipe in the rest before the furnace-mouth, and, gently turning it round, he brings it again nearly to the melting-point; then he repeats the blowing and swinging, standing over the pit, to enable him to swing it completely round as it lengthens out. These operations are continued until the cylinder has reached its maximum size—i.e. until it is of equal thickness throughout, and sufficiently long and broad to admit of sheets of the required size being made from it (e, fig. 12). Sometimes these cylinders are made 60 inches in length, allowing sheets of glass 49 inches in length to be made from them, but the Belgians make them nuch larger. In the Vienna Exhibition they exhibited sheets 10 × 4 feet. The next operation is to place the pipe in the rest, and apply the thumb so as to close the opening at the blowing end: the heat of the furnace soon softens the glass at the closed extremity of the cylinder, and, as the enclosed air is provented escaping, as it rarefies, by the thumb placed on the opening of the blowpipe, it bursts at the softened part (f, fig. 12). The operator then quickly turns the cylinder, still



with its end to the fire, and the softened edges of the opening, which at first are curved inwards, are flashed out until they are in a straight lino with the sides of the cylinder (g, fig. 12). It is then removed, and placed on a wooden rest or

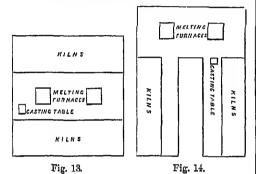
chevalet. Just at the shoulder near the blowpipe the workman wraps round a thread of redhot glass, which after a few seconds he withdraws; then he applies his cald sheats quickly, and the shoulder and neck drops off as neatly as if ent with a diamond. The removal of this neck of glass can also be effected by drawing a red-hot fron rod round the shoulder, and then dropping a little cold water upon it. The continuous tank furnace, and the pot furnaces of France and Belgium, are so arranged as to serve for both melting and blowing. In England the mannfacturers who employ pot furnaces prefer to have a separate construction, called the 'blowing-holes,' for the reheating and manipulation of the cylinder. The advantage of this method, as regards pot furnaces, is that the heat of the blowing-holes, being independent of the melting process, can be adjusted to suit the requirements of the blower.

The finished cylinder (h, fig. 12) is split open by a diamond attached to a long handle, and guided by a woodou rule. This was formerly effected by a red-hot iron rod. It is then taken to the flattening kiln, where it is laid with the split upwards on the flattening stone, which is generally covered by a sheet of glass called a 'lagre,' to protect the cylinder from the irregularities of its surface. Here the heat is sufficient to soften without melting the glass, and the flattener, as it softens, opens the two edges of the erack until by its own weight the sheet falls flat on the stone; he then takes an implement in the form of a rake, made by placing a piece of charred wood transversely at the end of a long handle, and this is gently rubbed over the glass, producing a very smooth surface. The annealing arch, and the flattening stone mounted on a wagon and earrying the sheet of now flat glass is moved into the annealing chamber. Here, when cooled enough to bear moving, the sheet is first placed horizontally, and afterwards with others piled upright. The wagon is in this way moved from one chamber to the other with successive sheets of glass until the annealing oven is filled. The oven is then closed up so that it may be free from draughts, and allowed to cool slowly down for a period varying from three to five days. The annealing may be accelerated by substituting for the oven a series of inon boxes on wheels, which are filled in succession with the sheets on edge, and pass on when full into a cooler place. There is another and more modern form of lear in which the flattened sheets are passed through the annealing chamber one at a time. A single sheet will cool very rapidly, and at the end of about half an hour will emerge thoroughly annealed.

Glass-shades are made in the same manner as above described; they are nothing more, indeed, than the rounded ends of the cylinders before being burst. When wanted oval or square, these forms are produced by the use of boxes of wood charred inside, of the size of the shades required, through which the cylinder is passed, when being blown, until the soft glass touches and receives its shape from the inside of the box or mould; they are afterwards annealed, and cut to the lengths required.

Plate-glass is made in a totally different manner from crown or sheet. Great care is taken in the selection of the materials, as they require to be of a purer kind than those used for ordinary window-glass. From its thickness, any impurity of colour is readily noticed, and, on account of its flat surface when polished, air-eavities are conspicuous defects. The sand used must be as free as possible from iron, the staining power of which is most usually corrected in the case of plate-glass by the addition of a little arsenious acid. Almost every manufacturor has his own private receipt for the mixture

of materials, but the following may be taken as an average: Fine sand, 100 lb.; refined sulphate of soda, 42 lb.; carbon in powder, 2½ lb.; carbonate of line, 20 to 25 lb.; arsenic, 8 oz.; cullet, or broken plateglass, ad lib. Refined sulphate has completely taken the place of carbonate of soda. for use, the pot is lifted out of the furnace (fig. 13) by means of the forceps, and wheeled up to the casting table (fig. 13); here it is seized by a crane and tackle, by which it is lifted, and so nicely poised over the table that it can be easily tilted so as to pour out its contents. All this requires so much care and steadiness that the men, impressed with the great danger of earelessness, usually preserve perfect silence during their work. The table is of large size—nanally about 30 feet in length, by 10 to 20 feet in width. When the red-hot glass, which 20 feet in width. When the red-hot glass, which is not in a very liquid state, is poured on, it immediately begins to spread; two strips of iron, a little thicker than the plate is intended to be, are placed on each side of the table, and a steel or eastiron roller is laid across, resting on these strips,



which regulate the thickness of the plate, and also, by their distance apart, determine its width. The roller, passing backwards and forwards at a uniform speed over the table, spreads the glass into a plate of the size required. In some works the castingtable with its apparatus is run on rails from kiln to kiln, and in this ease the plate is pushed direct from the table into the kiln. In other works (and this is the more modern plan) the casting table is fixed, and the plate is pushed from it on to a movable table, and thence into the kiln. The annealing ovens or kilns are large shallow brick chambers, in which the places lie during the process of annealing, and which are heated to a suitable temperature prior to receiving the glass.

It is obvious that in the arrangements of the easting hall considerable variety is possible. the older works the furnaces were in the middle, and the annealing kilns on either side. Fig. 13 represents a hall of this kind. Fig. 14 is a more modern arrangement, and, of course, other combinations can be adapted. When the plates are sufficiently cool to be removed from the kilns they are carefully examined, and such as are sufficiently free from defects are taken to the grinding-room. Formerly the grinding process was accomplished by rubbing one plate upon another, with sand interposed, both plates being bedded in plaster. At the present time for the upper glass is substituted a rubbing plate of cast-iron, both the lower plate of glass and the upper one of iron being set in motion while in contact by machinery adapted for the purpose. In the preliminary stage of grinding, sand and water are used; but, when the greater portion of the rough surface of the glass has been removed, the process is completed by using powdered emery of the coarser sorts. When one surface of the glass of the coarser sorts.

has been thus treated, the operation is repeated on the other. The next process is that of smoothing, for which a separate machine is required. Instead of east-iron plates, one sheet of glass is used to rub upon another, the upper sheets which are movable being weighted. Emery of the finer description is used in this process, the final touches being given by hand, with the aid of the very finest emery powder. After both sides have received this smoothing, the plates are removed to another room, where they are again embedded on tables which are movable by machinery, so that the whole surface of the plate may be brought under the action of the polishers. These are padded iron buffers attached to short iron rods passing through holes in a beam acted on by springs or weights. The buffers are covered with felt, and rub the glass as it passes from side to side; the surface of the glass being supplied with oxide of iron, in a very fine state of division and mixed with water. When any inequalities are encountered, the springs yield and allow the buffers to pass ficely over them. An older plan of polishing is to use wooden rubber-blacks extend with fall. blocks covered with felt.

Rolled Plate.—Mr Hartley, of Snuderland, intro-duced about 1850 a method of making rough plateglass suitable for roofs and other purposes where light only is required without transparency. The easting table has generally a series of fine grooves upon it, but it can be marked with any required upon it, but it can be marked with any required pattern. Very large pots or continuous tanks can be used for this process, as only a ladleful of glass is required for each sheet. Quite recently rough plate has been made by passing the contents of the ladle between two rollers revolving in opposite directions, but the glass thus made has not as yet superseded that made by Mr Hartley's process.

Patent Plate.—Sheet-glass made by the cylinder process, when free from flaws and of good colour, is to a limited extent ground and palished much in the same way as ordinary plate-glass, but it is an advantage for some purposes, such as the glazing

an advantage for some purposes, such as the glazing of picture frames and for photographic negatives. It is called patent plate to distinguish it from east plate-glass.

Qualities of Plate glass.—It is of importance to know that there is a great difference in the quality of plate-glass supplied by different manufacturers. We do not refer to air cavities or other imperfec-tions which can be readily seen, and from which the lighest-priced glass, such as that used for unirrors, is almost entirely free; but to a defect by which the transparency of the whole surface of the glass is impaired. It will often be found, for example, that, of two plates apparently equally pure and free from flaws, one will take on a peculiar dinness a few days after being eleaned, while the other will remain quite clear and transparent for as many weeks. Plate-glass which does not keep long clean—to use a homely phrase—may often pass ununticed for a long time until experience of a better quality calls attention to it. Some inferior qualities of 'pressed glass,' noticed below, also take on a kind of senin even when newly cleaned, a fault most readily noticed in plain articles.

Flint-glass.—M. Bontemps in his Guide du Verrier

gives the following mixture for ordinary flint-glass: Sand, 100; red lead, 66 66; carbonate of potash, 33 33—i.e. one part of carbonate of potash, two of red lead, and three of sand. Sometimes a little peroxide of manganese is added, and a portion of the carbonate of potash may be replaced by refined nitrate. Cullet is usually added to the extent of about one-fourth part of the whole mixture. pots for flint glass (fig. 6) are covered or hooded, so as to protect the melted glass from any impurities in the flames of the furnace. The materials used are

very carefully selected, as the glass must be of great purity; the greenish tint in sheet or plate, due to the soda, would be very objectionable in flint glass. Its brilliant flashing appearance, when cut into suitable patterns, is owing to its high power of refracting and dispersing light, a property arising from its comparatively high density. The working of flint-glass resembles in a general way that of the other kinds; and, as we have not room for details, we note here a list of the stages in making a wine-glass, to give an idea of the process up to the point where the manipulation of the metal in a welding state finishes: (1) Gathering of metal; (2) same marvered, and bowl formel; (3) glass with metal for stem dropped on; (4) same with stem formed; (5) same with foot stack on; (6) same with foot heated and half opened; (7) same with foot opened, howl cracked all, heated, and sheared; (8) same finished. It is then annealed. Crystal is a name loosely used for superior

the delication of the state of for example, a combination of the two kinds is necessary to make it advomatie-their unequal densities conferring upon them different refractive powers. Good flut-glass for optical purposes is extremely difficult to make, especially when the required slabs or discs are of large size. It must be perfectly homogeneous and free from strice, and it will be deficient in refractive power if it does not contain a very large proportion of lead, which, from its weight, has a strong tendency to settle at the hottom of the crucible, and so destroy the homo-geneity of the glass. 'The fused glass is therefore generally stirred until it has cooled to a consist-ency anfficiently thick to prevent the lead settling, and is then left still in the crucible to complete the cooling. When cold, the crucible is broken away, and the result is a cake of immensely heavy glass, of which it is not yet known whether the value is to be calculated in pounds or pence.' It is afterwards reheated, brought to the required disc-like shape, and then tested for flaws. If these are numerous, as many smaller discs or slabs are taken from it as possible. Mesers Chance of Birmingham supplied in 1871 a pair of dises 26 inches in diameter for the telescope of the Washington Naval Observatory. The Lick Observatory and other large dises will be mentioned under TELESCOPE. The hard crown made by the above firm has a density of 2.485; soft erown, 2.55; light flint, 3.21; and double extra dense flint, 4.45. A great many experiments in connection with optical glass have been tried of late years with chemical substances other than those we have unued, the results of which will be found in the Reports of the British

Association for the Advancement of Science.

Slug-glass.—The slag from iron blast-furnaces is itself a coarse glass, but, until lately, it has been a waste product in the fullest sense. Bricks, however, have been successfully made from it of late years; and still more lately, under a patent obtained by Mr Bashley Britten, glass bottles are being unade from it by a company in Northamptonshire. The slag is used in the molten state as it runs from the iron-furnaces, which, of course, so far saves fuel; lmt it requires to be mixed to the extent of nearly one-half its bulk with other materials. The process is said to be successful; yet we fancy there must be great difficulty in procuring, for any length of time, slag of nearly the same composition. Stag-wool is a name for the same iron-slag when blown into glass threads of a hair-like fineness, in which state it somewhat resembles wool, and is now much used for covering steam-boilers, it being, like all glass, a powerful non-conductor of heat.

Toughened Glass. - Much curiosity was excited

when, in 1875, M. de la Bastie, a French engineer, announced that he had succeeded, after many making glass so 'tongh' that it experiments, in making glass so 'tongh' that it could scarcely be broken. So great was the value which the inventor attached to his process, that he demanded no less than one million sterling for the English patent right, and abroad it was proposed that the purchaser of the patent should pay so much per head of the population. His original process consists in heating any piece or pieces of glass till they are about to soften, and then plunging them into a lasti of oil at a greatly lower temperature. Usually, however, a mixture chiefly of oily substances, such as oils, tallow, wax, rosin, &c., is put the bath; and some manufacturers, who worked the process for a time, dropped the newly-made glass vessels while still hot into the oleaginous mixture, by which plan neither reheating nor annealing by the ordinary process is required. After the articles acquire the temperature of the hath, they are removed. Either from the want of care or from some other cause, the results of the treatment of glass by De la Bastie's process are not uniform, because many samples of his tanghened, or, as it should rather be called, hardened glass, are almost as easily broken as ordinary glass. Objects such as tumblers, when allowed to fall, nearly always break if they strike the floor on the lip or mouth. Still, there is no doubt that most glass treated by this process will stand a great deal of rough usage, and that some examples are practically unbreakable. In the case of window-glass, there is the disadvantage that a diamond will not cut it, and no variety of glass so hardened can be safely engraved or 'ent,' because when the tool penotrates much below the skin the glass falls to pieces—almost to dust. This is a difficulty which has hafted not only M. de la Bastie, but all other producers of the hardoned article. These defects, as well as the high price of toughened glass, have as yet prevented its coming into extensive use.

In 1885 Mr Frederick Siemens produced three kinds of 'tempered glass,' of very homogeneous character and of great strength and hardness, by means of his regenerative gas-radiating furnace, 'Press-hardened glass' is that which, after being cut into the proposed shape, is saftened in the radiation furnace, and then placed between cold metal plates. It may thus be so rapidly couled

that the diamend will not touch it.

Colouring of Glass.—Any kind of glass can be coloured by metallic oxides, and the chief colours given by these are noted in the following list. Crimson of various shades, from gold, 'Purple of Cassius' (a compound of gold and tin) being the compound generally used. So small a quantity as Troduct the part of gold imparts a rese colour to glass. A red colour is also gut from protoxide of copper. Purple or violet red is obtained from peroxide of manganese. Blue from oxide of cobalt or oxide of eopper, but chiefly from the farmer. Green from the same oxides, together with sesquioxide of iron; a fine green is likewise gut from sesquioxide of chromium. Yellow from oxide of antimony or sesquioxide of iron; sometimes from carbon. Sesquioxide of uranium gives a beautiful opalescent-yellow with a greenish cast. Chloride of silver is used to stain glass yellow. Arsenions acid produces an opaque white; so also does the mineral Cryolite (q.v.), as well as aluminate of soda. Aventurine glass is a beautiful material of a brownish-red colour, with gold-like spangles, in imitation of Aventarine (q.v.) quartz. It is largely used in the ornamental glass made at Venice.

Coloured glass is made in several ways. When the colour is all through the body, the glass consists of pot-metal; but for some purposes, and especially when the colouring material is expensive, it is

flashed-i.e. a thin veneer of colour coats a greater thickness of clear glass. In this case the two layers are 'gathered' from different pots on the blowing-iron, and blown out together as one sheet. Sometimes a very thin coloured coating is put on clear glass by spreading, say, a red glassy powder on the surface of the latter, and then carefully fusing it. When the chloride or other salt of silver is used to give a yellow, orange, or red, the glass is merely stained on the surface. In painted glass the decoration is usually produced by the use of enamel colours painted on with a brush, and afterwards fired at a moderate heat. Single sheets of glass, each with several shades of the same colour, gass, each with several snades of the same colour, are now made for glass-stainers, by which much shading by hand is dispensed with. A pane or vessel of flashed glass may be ornamented by partially removing the coloured layer, either by enting or etching; and in the case of many designs additional enamel colours are added. Hydrofluorie acid, which corrodes glass, is commonly used to produce etched patterns upon it, by protecting certain portions with a varnish, and allowing the acid to act upon the unprotected parts. For painted windows, see GLASS (PAINTED); and for artificial gems of glass, see STONES (PRECIOUS).

The beautiful iridescence of much very ancient glass is known to be due to the partial decomposition of its surface and the formation of immunerable thin scales. Many attempts have been made to produce a like result artificially, and several methods have been successful. One is to submit the object to the influence of acid solutions, with

the help of heat and pressure.

Venice, which prior to 1859 produced almost nothing in glass but beads, now, thanks to Salviati (q.v.), is once more making on a large scale glass objects, whose quaint forms and rich colours are but little, if at all, inferior to the best products of her ancient glass-houses. The well-known Bohemian glass, nucli of which is coloured and gilt, but which in past days was often more showy than tasteful, has recently shown quite remarkable advances in the character of its decoration. very tastefully ornamented coloured glass is also

made in France.

Glass-outting and Engraving.—It is usually flint-glass that is so treated; and vessels intended to have cut patterns are blown with thick walls. The first operation in glass-cutting is usually done on an iron grinding-wheel 10 or 12 inches in diameter, and about three-fourths of an inch thick, which is made to revolve vertically by means of a belt and pulley. Immediately above a hopper-shaped eistern is placed, which supplies the whoel with the necessary mixture of sand and water. If a faceted pattern is to be given to a decanter or other object, it is first roughed out on this wheel by the grinder holding the vessel against it. The facets now formed on the glass are next made smoother by a fine sandstone wheel, fed with water only, and similarly driven. For many purposes this whice is of an angular section on the edge. The ground parts are finally polished upon a wooden wheel, supplied with moist patty-powder (oxide of tin) or other line polishing material. The obscuring of glass by the ordinary process is done with sand and water alone; but much of this kind of work is now done by Tilghman's sand-blast process, to be presently noticed. Engraved patterns are produced by means of small copper discs, revolving in a lathe, emery powder, mixed with oil, being applied to the edges of their circumference. We have already referred

to the use of hydrofluoric acid for etching glass.

Tilghman's Sand-blast.—This is a very striking invention. The well-known fact that windows exposed to the action of wind-blown sand by the seashore eventually become completely obscured

appears to have suggested the process to Mr Tilghman. The Matthewson's patent sand-blast apparatus, manufactured by the Tilghman's Patent Sandblast Company, is altogether independent of any blower or engine, and occupies a very small space, being about 2 feet square and $3\frac{1}{2}$ feet high. The piece of glass to be operated on is held on the top of the machine. The sand is set in motion by a steam ejector (part of the machine), being drawn by the vacuum caused by the flow of steam into an applied to the steam of the machine of the steam into an applied to the steam of the machine of t annular space where it mingles with the steam, and is ejected through a small pipe against the glass. The machine does exceedingly fine and quick work as regards obscuring both plain and dashed glass. It cuts away the flashed surface almost as soon as the glass is held in position. The parts which are to remain bright are protected either by a composition or by blotting-paper, which, having been soaked in glycerine and glue, has been stuck on to the glass, and from which the pattern is ent out. The blast will drill holes in a pattern is ent out. The blast will drill holes in a glass plate 1 inch thick of a diameter from 1 inch to I inch in less than two minutes. This machine is not adapted for obscuring large sheets of glass, This machine which is accomplished by a machine in which the sand is sot in motion by a Baker's blower driven by a non-condensing engine. The latter apparatus is not capable of perforating glass or of removing the flashed surface.

–By this name is known a eertain Pressed Glass.cheap class of objects, such as tumblers, small dishes, &e., with patterns in imitation of cut glass. It is an American invention, and the process consists in pressing or shaping glass into form by means of a metal mould and reverse, called a plunger, or, for larger work, by a weighted lever, or a screw and fly-wheel. The chief seat of this branch of the trade in Great Britain is at New-eastle-on-Tyne, where a glass in which baryta is largely or wholly substituted for lead is used. By a somewhat similar but much older process, 'pinched glass' objects such as buttons are largely

made at Birmingham.

Soluble Glass.—When silica (flint or sand) is fused with an excess of akali, a glass is formed which is slowly soluble in cold, but readily soluble in hot water if powdered. The soluble silicate of soda or of potash formed by this or by other methods is known as soluble glass or water-glass. When pure and solid it has the appearance of common glass, and it is the more soluble the larger the quantity of alkali that it contains. This substance has a number of applications in the arts. When a solution of it is mixed with sand, ground chalk, dolomite, or other minerals, it gradually binds them into a stony mass. See STONE (ARTIFICIAL), It is also employed as a Cement (q.v.). Soluble glass is useful as a material for rendering calico and even wood non-inflammable, for improving the cleansing power of cheap soaps, and as a dung substitute in dyeing. A small quantity of silicate of soda mixed

with hard water improves it for washing purposes.

As far back as 1825 Fuchs of Munich suggested the application of soluble glass to the surface of the application of solubic glass to the surface of fresco-painting, in order to fix the colours, the climate of northern Europe not being suitable for the preservation of this kind of decoration, when simply executed in the old way, with colours applied with water on a plaster ground. It has frequently been stated that Fucha's plan of applying solutions of silicate of soda or silicate of potash to fresco-painting has effectually preserved it. But in mosteases it has not done so. The action of the careases it has not done so. The action of the carbonic acid of the atmosphere upon either of these compounds has usually, in the course of time, brought out an ellorescence like mildew on the surface of the picture. Professor Barff, who has paid a good deal of attention to the behaviour of 246 GLASS

these soluble silicates, asserts, in an essay written in 1876, that if, instead of silicate of sola or silicate of potash, a solution of aluminate and silicate of potash be used with the fresco colours on a properly prepared ground there is no fear of the surface decaying, and adds that paintings excented in this way have stood for many years. The plaster-ground should consist of sand and line, but no plaster of Paris should be mixed with it.

The name Volcanic Glass is not infrequently

given to Obsidian (q.v.), as also to vitreons lava, and even to a kind of pitchstone.

and even to a kind of pitchstone.

See Neri, Ars Vitraria (Amsterdam, 1668); Pellat, Curiosities of Glass-making (1849); Sauzay, Marvels of Glass-making (1859); Peligot, Le Verre, son Histoire, sa Fabrication (1877); Nesbit, Glass: South Kensington Museum Art Handbook (1878); Froehner, La Verrerie Antique (1879); Gerner, Die Glas Fabrikation (1880); Chance, Treatisc on Crown and Sheet Glass (1883); M. A. Wallace-Dunlop, Glass in the Old World (1883); Gerspach, L'Art de la Verrerie (1885).

Glass, PAINTED or STAINED. There are two kinds of painted glass known in modern times, There are two Enamel and Mosaic glass. In enamel glass proper certain fasible pigments are painted on a slicet of white glass, which is then fired, and the result is a picture the tints of which even in the high lights are not wholly transparent. A modification of this method produces its picture partly by enaunelling on white glass, partly by the use of pot-metal glass (i.e. glass coloured while in a state of fusion, and therefore of the same that all through), the colour of which is heightened or modified by the use of enamels. In this style, if any junction between two pieces of glass becomes necessary, the lead calms used for the purpose are studiously concealed by being made to run along leading lines of drapery or other forms in the picture. The object of this enamel and semi-enamel glass-painting is the closest possible imitation of an oil or watercolour picture; and the results of it are never satiscoton picture; and the results of it are never satisfactory. For at the best it can only do with difficulty and imperfectly what the oil-painting does with ease and perfection; while at the same time it refuses to avail itself of the special characteristics of glass, which can produce effects that no opaque painting can approach. This imitation of easel or wall pictures also leads the designer into making designs unfitted for the correspond to fairly the correspond to th designs unlitted for the ornament of windows, and wandering from their true purpose of decoration. Indeed, not infrequently the work of a great master in picture-painting is taken as a model for a stained-glass window, and laboriously and servilely initiated. imitated, with the result that a mere caricature of the great work is produced, which is as far as possible from being an 'ornament' to the building in which it is placed.

The only method capable of producing stained glass which shall be beautiful and interesting, and which at the same time can plead some reason for its existence, is that which has been called musaic glass, the process of which very briefly stated is as

follows:

A design is made wherein the drawing is given and the colours indicated, which is the workingand the colours indicated, which is the working-drawing of the glass-painter. From this working-drawing a kind of map is made which gives all the various pieces of the mosaic. The glazier ents theso pieces out from sheets of glass of various colours, and hands thom back to the painter, who proceeds first to paint the leading lines with a solid opaque onamel, the colouring matter of which is an oxide of iron. This being done (and the glass sometimes having been fired at once, but sometimes not), the pieces of glass are stuck together temporarily (by means of wax) on a glass easel, and the painter slightly shades his bold traced lines with the same opaque colour; using sometimes washes (in which opaque colour; using sometimes washes (in which

case, of course, the colour is much diluted, and is only semi-opaque), and sometimes hatching of lightly laid on lines, as in a black and white drawing on paper. Sometimes both washes and hatching are used, and sometimes the washed shadows are 'stippled'—i.e. part of the colonr is removed by dabbing it with the end of a broad brush. In any case the object of the methods of shading is to keep the shadows as clear, and to dull the glass as little as the explanation or expression of the subject will admit of. Two or three or more firings are necessary during the process of this painting, but as far as the painting as distinguished from the mosaic is concerned this is all that has to be done, though it must be said that to do it well requires considerable experience and artistic skill and feeling.

This painting being dune, the glass goes back to the glazier's bench again, and he 'leads it up' (i.e. joins it together with lead calms soldered at the inuction), and the window, after having been solidified by a stiff coment or putty rubbed into the leaf of the leads, has then only to be put in its place and strengthened by the due iron stay-bars. It may be mentioned here that in this mosaic glasspainting, so far from there being any necessity for concealing the 'lends,' it is highly desirable to break up the surface of the work by means of them, always taking care that their direction is carefully cansidered from the point of view of their appearance. The obvious strength which the network of thee. The winds soringer when the records of leads gives to the window on the one hand, and the obvious necessity for picking out small pieces of exquisite colour on the other, take away all sense of discounfort in the arbitrary disposition of these constructive lines.

A mosaic stained glass window, therefore, seems a very simple affair, and so it is as a process (hating some difficulties in the making of the material). Its real difficulties are all on the artistic side, and have to do with the qualities of design

and the choice of material.

As to the design, it must be repeated that suggestion, not imitation, of form is the thing to be aimed at. Again, the shading is, as above said, for the sake of explanation, not to make the work look round, and also for diversifying the surface of the glass, to make it look rich in colour and full of detail. The qualities needed in the design, therefore, are beauty and character of outline; exquisite, clear, precise drawing of incident, such especially as the folds of drapery. The whole design should be full of clear, crisp, easily-read incident. Vagueness and blur are more out of place here than in any other form of art; and academical emptiness is as great a fault as these. Whatever key of colour may be chosen, the colour should always be clear, bright, and emphatic. Any artist who has no liking for bright colour had better hold his hand from stained-glass designing.

Consideration of the colonr of the work naturally leads to consideration of the material. The ordinary machine-made window-glass, thin, and without any variety of surface, is wholly unfit for stained glass, but it should be stated in passing that a modern mechanical imitation of the unevenness of surface found in old glass, which is commonly called 'cathedral glass,' is the worst of all materials for windows, and should never be used in any kind of glazing, ornamental or plain. The due varieties of surface are those that occur naturally in the process of are those that occur naturally in the process of making thick cylinder or crown glass. All glass used for glass-painting should be very thick, or, whatever the pigments used for colouring may be, the effect will be poor, starved, and, if bright colours be used, glaring. The glass which has to show as white should, when laid on a sheet of white paper, be of a yellowish-green colour; for the colours in stained glass are so powerful that GLASS 247

unless the whites are toned in the material itself they will always be inharmonious and cold.

It is necessary in addition to state briefly what the varieties of coloured glass proper for the purpose arc. First comes pot-metal, in which the colour is an integral part of the glass; then flashed-glass, where the colour forms a coloured skin to a white where the coloni long a context with the whole body; * and lastly a transparent yellow stain (deduced from silver), which attacks the silica, and thus forms a part of the glass, is much used to colour portions of the pot-metal, for ornaments on

dresses, hair, flowers, and the like.

This art of mosaic window-glass is especially an art of the middle ages; there is no essential difference between its processes as now carried on and those of the 12th century; any departure from and those of the 12th century; any departure from the medieval method of production in this art will only lead us astray. It may be added that its true home was northern Enrope during the middle ages, as the importance of the wall-pictures in Italy made its fullest development less necessary to the buildings in that country, and accordingly the Italians did not understand its principles so well as the artists of France and England, and had not the full measure of unerring instinct which the latter had. And besides, as Gothic architecture lasted longer with us and the French, there was more opportunity for the development of the later styles here, since the neoclassic architecture had scarcely a place for stained glass.

The 12th century begins the real history of the t. The windows of that date that are left us are very deep and rich in colour, red and blue being the prevailing tints. They are mostly figure designs, disposed in ornamental frames, and are admirably designed for their purpose; the painting is very simple, nothing but a little washed shading supporting the traced lines; the figures are usually small, except in the case of windows far removed from the eye, as in some of the windows at St Denis near Paris. The beautiful windows in the choir aisles at Canterhury Cathedral are usually referred to the 12th century, but if they belong to it they must be of its later years.

There was a slow development of the glass all through the earlier years of the 13th century, and a great deal more work is left us of that period; a great deal of the glazing of the early pointed archi-tecture was of mere geometrical work. The ignorant architect, Wyatt, who gutted Salisbury Cathedral in 1790, found most of the windows so glazed, and destroyed the glazing except for a few frag-ments. The window of the north transept at York Minster, now called the 'Five Sisters,' is a well-

known example of this beautiful work.

The 14th or end of the 13th century invented a very beautiful kind of glazing especially suitable to the large traceriod windows then coming into vogne; in this style bands of very richly coloured figure glass, usually framed in canopies, run across the lights, and are supported by ingenious fret-glazing in white, on which elegant running patterns arc freely drawn, and this grisaille (as it is called) is connected with the richer-coloured bands by means of borders, and with medallions, little gemlike pieces all earefully patterned; the whole producing an effect of singular elegance and richness, and admitting plenty of light. The nave aisles of York Minster and Mertou College Chapel at Oxford may be cited as giving us very perfect specimens of this glazing, which may be said to be the highest point reached by the art.

With the change to the Perpendicular style in the 15th century came a corresponding change in

stained glass, though, of course, that change was yery gradual. The glass now had a tendency to become paler in colour; a great part of the great traceried windows of the style was oftenest made up of elaborate canopies, in which white touched with yellow stain played a great part. Some very beautiful windows of this date are almost entirely carried out in silvery whites and yellow stains. The shading of the figures and drapery, &c. was much more claborate; the stippling and hatching above mentioned was common, especially in the later part of the style; but the luminous quality of the shadows was generally well maintained. In spite of the ravages of the Puritans both of the Reformation and of the Crouwellian episodes, examples of stained glass, usually very fragmentary, are common throughout England. The antechapel at New College, Oxford, the great east window of Clayers extended. Gloncester cathedral, many windows in the choir of York Minster, and many of the parish churches in that city, notably All Saints, North Street, are splendid examples of the work of this period.

In the 16th century the art was on the wane: it

became heavier in shading, less beautiful in colour, and aimed too much at pictorial effect. As a reasonable art stained glass can hardly be said reasonable art stained glass can hardly be said to have existed after about 1540; a few pieces of rather pretty and fanciful glazing and a little heraldic work are in the Elizabethan period all that represent the splendid art which adorned such buildings as York Minster and Canterbury Cathedral. The windows of Fairford Church, in Gloucestershire, form a very interesting collection of the work of the earlier part of the century. King's College Chapel at Cambridge is almost entirely glazed with picture-work of this period. It has suffered much from reglazing, and is now very hard to read; nor could the art in it have ever been

of a very high order.

With the rain of Gothie architecture stained glass was swept away entirely; and indeed it perished sooner and more completely than any of the other subsidiary arts, doubtless because its snecessful practice depends more on the instinctive understanding of the true principles of decorative art than any other of the arts connected with

architecture.

The art of glass-painting has been revived with the eclectic revival of Gothic architecture, which is such a curious feature of our enoch, and has shared to the full in the difficulties which an the times of necessity meet with. Still it must be understood that glass-painting is no 'lost art' in the sense of its processes being forgotten: whatever the deficiencies of the modern art may be, they are the result of the lack of feeling for decoration, rather than of difficulties as to material, workshop receipts, and the like. The very praiseworthy studies of Mr Winston and his collaboration with Messrs Powell of Whitefriars in the manufacture of window-glass fit for the purpose made it possible for us many years ago to produce good stained glass windows if our artistic powers did not fail us, or rather if they could be turned into the right direction; if the designers could understand that they should not attempt to design pictures but rather pieces of ornamental glazing which, while decorating the buildings of which they formed a part, should also tell stories in a simple straightforward manner.

This they have in a great measure learned to understand, and the public also are beginning to see that the picture-window of the semi-enaurel style (as represented chiefly by the claborate futilities produced by the Munich manufactories) cannot form, as a window should do, a part of the architecture of the building. On the other hand, there has been (unavoidably doubtless) too much

r Flashed-glass is mostly used for the beautiful 'ruby' glass deduced from copper, the making of which was revived by Messrs Powell of Whitefrars, in London, with the help of Mr Winston about the year 1863.

mere copying of medieval designs; it has been forgotten that the naivetés of drawing of an early and obviously belonging to their own period, be-come ridiculous when imitated in an epoel which demands at least plausibility of drawing from its artists. But that very demand for plausibility and the ease of its attainment form another snare for the stained-glass designer, whose designs, though made with a knowledge of the requirements of the art, and though not actually imitative of medicval work, are too often vacant and feelingless, mere characterless diagrams, rather than the expression of thought and emotion, as the work of the middle ages always was in spite of any rudeness of drawing

or shortcoming in knowledge.

One drawback to the effectiveness of painted windows comes from the too common absence of any general plan for the glazing of the building. The donors of windows are allowed to insert what-The donors of windows are allowed to meer whatever may please their individual tastes without regard to the rest of the glazing or the architectural requirements of the building; so that even where the window is good in itself, it fails in effect of decoration, and injures, or is injured, by its neighbours. The custodians of buildings before they allow any window to be put up should have some good plan of glazing schemed out embracing a system of subjects, an architectural arrangement, and a scheme of avantage of glazing and this plan. and a scheme of proportion of colour, and this plan should be carefully adhered to. Thus, one window would help the other, and even inferiority of design which help the other, and even interiority of design in one or two of the windows would be less noticed when the whole effect was pleasing. The gain of such a careful arrangement is sufficiently obvious in cases where the ancient glazing of a church is left intact; as, for instance, in the beautiful church of St Urbain at Troyes, a work of the end of the 13th century, and whose glazing is perhaps on the whole the most satisfactory example of the art of glass-painting.

On the whole, it must be said of our modern stained glass that its worth must mainly depend on the genuineness and spontaneity of the architecture it is intended to decorate: it must stand or fall along with the feeling for art which inspires this architecture, for its existence is impossible without architecture of some sort, and if that architecture is less than good and genuine, the stained-glass windows in it become a mere congeries of designs without unity of purpose, even though each one may be good in itself.

Glasschord, or Musical Glasses. See Har-MONICA.

Glass-crabs (Phyllosoma), the larval forms of rock lobsters, &c. (Palimuridæ), but formorly regarded as adults, and made into a genus or even family. The body consists of two transparent leaf-like discs; there are beautiful eyes on long stalks, twenty pairs of appendages, and a small abdomen.

Glass-houses. Sec Plant-houses.

Glass-houses. See Plant-Houses.
Glassites, a small religious seet which sprang up in Scotland about 1730, when its founder, John Glas (1695-1773), a native of Auchternnehty, in Fife, and minister from 1729 of Tealing, near Dundee, was deposed by the General Assembly of the Church of Scotland, chiefly on account of views which he had adopted and published concerning the nature of the kingdom of Christ. In his Testimony of the King of Martyrs concerning his Kingdom, founded on the words of our Saviour recorded in John, xviii. 36, 37, Glas maintained that all national establishments of religion are unlawful national establishments of religion are unlawful was thus probably the first assertor of the Voluntary principle in Scotland. He also advocated a system of church-government essentially Inde-

After his deposition pendent or Congregational. he became the paster of a congregation of his followers, and a number of small churches were soon formed on Glassite principles, not only in Scotland, but in England and America; but both in England and America the name of Glas's sonin-law, Robert Sandeman (1718-71), prevailed over his own, and the seet received the name of Sandemanians. Sandeman is chiefly known from his advocacy of certain views respecting the nature of saving faith, essentially consisting in representing faith as 'a bare belief of the bare truth,' in no way differing from assent to ordinary human evidence, though regarded by him as the fruit of divine grace.

The Glassites maintain a plurality of teaching elders or bishops in every church, but do not require any special education for this office or separation from secular employments; they hold a second marriage a disqualification for it; they deem it unlawful to join in prayer with any one who is not a brother or sister in Christ; they observe the Lord's Supper weekly; they maintain love-feasts between morning and afternoon services, at which it is incumbent on every member to be at which it is incument on every member to be present; they are rigid in abstaining from things strangled and from blood; and in general hold by the most literal interpretation of other Scripture rules, as concerning the kiss of charity, while they regard the lot as sacred, and their charity is regulated by their opinion that the accumulation of wealth is unscriptural. The adherents of the denomination, never a numerous bady, now purplet nomination, never a numerous body, now number perhaps 2000. Faraday (q.v.) was a Glassite.

Glass Paper or Cloth is made by powdering glass more or less finely, and sprinkling it over paper or calico still wet with a coat of thin glue: the powdered glass adheres as it dries. Glass paper is very extensively employed as a means for polishing wood-work.

Glass-rope Sponge (Hydonoma), a Japanese flinty sponge (one of the Hexactinellida), the body of which is anchored in of which is anchored in the mud or coze by a spirally twisted wisp or rope of siliecous threads. The latter, stripped of the sponge and manipulated by the Japanese divers, is a common curiosity. See SPONGES.

Glass-snake (Ophisauris ventratis), a limb-less serpent-like lizard (belonging to the shorttongued section) common in North America from Wirginia to Florida. It is about 3 feet long, and varies greatly in colour. The joints of the tail break off readily on irritation, but are soon reproduced. The glass-snake feeds on worms, insects, mice, &c., chooses dry regions, and spends much of its time in holes under-

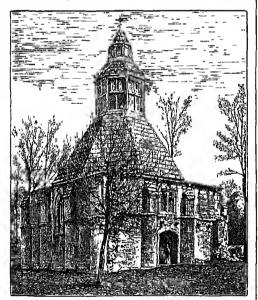


ground. Only the above Hyalonema, species is known, but a closely-allied genus (Pseudopus) occurs in southern Europe and Assam.

Glasswort (Salicornia), a genus of Chenopodiaceae of which one species (S. herbacea), a leafless plant with jointed stems, is common in saltmarshes in Britain. It makes a good pickle or antiscorbutic salad. Several species grow abundantly on the shores of the Mcditerranean, and, as they contain a large quantity of soda, were formerly of importance in making barilla, along with the species of Saltwort (q.v.).

formerly of importance in making barilla, along with the species of Saltwort (q.v.).

Glastonbury, an ancient municipal borough of Somersetshire, lies, engirt by the river Brue, amid orchards and level pastures—once fen-land—at the foot of the conical tower-crowned Tor (500 feet), 6 miles by rail SSW. of Wells, and 36 S. of Bristol. The Celtic Vnysvitrin, the Avadon of Arthurian legend, and the Glastingaburh or Glastings' borough of the West Saxons, it was hither, says William of Malmesbury, that Joseph of Arimathea came bearing the Holy Grail, here that he founded the first Christian church in Britain. On Weary-all Hill he planted his pilgrim's staff; it took root, and grew into the Holy Thorn, which hlossomed miraculously every Old Christmas-eve until it was cut down by a Puritan. [Grafts from it flourish still; one at Sutton Poyntz, near Weymouth, duly blossomed on the night of the 5th January 1884 in piesence of 250 persons. It is the Cratagus præcox of botanists.] Certain at least it is that, unlike Canterbury or York or London, 'Glastonbury was the one church of the first rank in England which stood as a memorial of British days, the only one which had lived unscathed through the storm of English conquest.' For the wattled basilica, which contained the grave of a St Patrick and of Gildas, was in 630 encased by Paulinus of York in boards and lead; and to the east of it in 719 King Ine reared the great church of SS. Peter and Paul.



The Abbot's Kitchen, Glastonbury.

This, spoiled by the Danes, was the abbey refounded by St Dunstan (q.v.) about 946, and became the sepulchre of Kings Edmund, Edgar, and Edmund Ironside, if not indeed of Dunstan himself, of Joseph of Arimathea, or of Arthur and Guinevere. It had just been rebuilt when in 1184 the whole pile was consumed by fire; and the splendid minster, 528 feet long, then undertaken by Henry II., was not dedicated till 1303. In 1539

Riehard Whiting, the last of its mitred abbots, was hanged on the Tor by Henry VIII.; and the ruins of this great Benedictine house, which had covered 60 acres, are now comparatively scanty, having long been the quarry of the district. Yet still on the site of the 'Vetusta Ecclesia' stands the roof-less chapel of Our Lady or St Joseph, a fine example of Transition Norman, with its 15th-century crypt; still there is the massive stone Abbot's Kitchen (14th century), 33½ feet square, and 72 high, with its four huge fireplaces and pyramidal roof. Apart from its abbey and its two parish churches, one of which has a noble tower 140 feet high, Glastonbury is a quaint, old-world place, a very store of domestic antiquities, with the 15th-century Pilgrims' Inn (now the 'George'), the Tribunal, and the Abbot's Barn. Sharphan, 2 miles south-west, was Fielding's birthplace. Sheepskins, mats, rugs, gloves, and pottery are manufactured. Pop. (1851) 3325; (1881) 3719. See Grall, Arthur; the Rev. R. Willis's Architectural History of Glastonbury Abbey (1866); and 'Glastonbury British and English,' by E. A. Freeman in Macmillan's Magazine for October 1880.

Glatz (Czech Kladsko), a town of Prussian Silesia, situated between two fortified hills, on the Neisse, 58 miles by rail SSW. of Breslau. It carries on manufactures of linen, damask, cigars, and leather, and has machine-shops, breweries, and distilleries. Pop. (1875) 12,553; (1885) 13,585. In 1429 Glatz was vainly besieged by the Hussites, but during the Thirty Years' and the Seven Years' wars it was frequently taken.

Clauber, Johann Rudolphi, a German alchemist and physician, was born at Karlstadt, in Franconia, in 1603 or 1604, and died at Amsterdam in 1668. No details regarding his life are known, except that he resided at Vienna, Salzburg, Frankfort-on-the-Main, and Cologne, from whence in 1648 he removed probably to Amsterdam. Although a believer in the philosopher's stone and in the elixir vitæ, he contributed very materially to the progress of chemistry. In 1648 he discovered hydrochloric acid whilst experimenting with oil of vitriol and common salt; he was probably the first to procure nitric acid; and his name has been transmitted in Glauber's Salt, which he likewise discovered. His treatises were published at Amsterdam in 7 vols., 1661; and an English translation was printed by Parke at London in 1689.

GLAUBER'S SALT is the popular name of the neutral sulphate of soda whose chemical composition is represented by the formula Na.SO₄ + 10H₂O. It occurs in long four-sided translucent prisms, terminated by dihedral summits, and containing ten atoms of water. On exposure to the air, the crystals lose all their water, and become resolved into a white powder. When heated they readily melt in their water of crystallisation; and, if the heat is sufficiently continued, the whole of the water is expelled, and the anhydrous salt remains. Glauber's salt has a cooling, bitter, and saltish taste; it is readily soluble in water; its solubility (in the ordinary crystalline form) increasing up to 92°, when it appears to undergo a molecular change, and to be converted into the anhydrous salt, which at this temperature is less soluble than the hydrated compound, and separates in minute crystals. Glauber's salt is a constituent of many mineral waters (as at Carlebad and Choltenham), and is found also as an efflorescence about saline lakes in some parts of the United States; and it occurs in small quantity in the blood and other animal fluids.

The anhydrous salt is prepared in enormous

quantity from common salt and oil of vitriol, with the view of being afterwards converted into carbonate of soda (see SODA). For medical use a purer form is required. The salt which remains after the distillation of hydrochloric acid—this salt being sulphate of soda contaminated with free sulpharic acid—is dissolved in water, to which is added powdered white marble (carbonate of lime), to neutralise the free acid, and to precipitate it as an insoluble sulphate; the solution is boiled down till a pellicle appears, is strained, and set aside to

envitallise.
It is used as a common purgative, and is especially applicable in fevers and inflammatory bowels without increasing or exciting febrile disturbance. The usual dose is from half an onnee to an ounce; but if it is previously dried, so as to expel the water of crystallisation, it becomes doubly efficient as a purgative. It is now much less frequently used in domestic medicine than formerly, having given place to milder aperients.

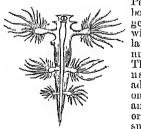
Glauchau, the second in rank of the manufacturing towns of the kingdom of Saxony, is picturesquely situated on the right bank of the Mulde, 20 miles W. of Chemnitz by rail. The town is the centre of the woollen-weaving industry, woollen goods to the value of £2,000,000 being exported annually. There are also dyewalks, print-works, iron-foundries, and carpet, paper, and machine factories. Pop. (1834) 6292; (1885) 21,661. See Eckardt, Chronik von Glauten 1899 213. chau (Glan. 1880-81).

Glanco'ma (Gr. glaukos, 'sea-green,' on account of a greenish colour sometimes seen in the pupil), a disease of the Eye (q.v.).

Glaucus, the name of several figures in Greek mythology. (1) Son of Hippolochus and grandson of Bellerophontes, commander of the Lycians in the Trojan war, slain by Ajax. He was connected with Diomedes by ties of hospitality, and when they met in battle they forbore to fight with one another, exchanging arms instead.—(2) Son of Minos of Ciete and Pasiphae, snothered when a boy the following into each of them. by falling into a cask of honey. The soothsayer, Polyidus of Argos, unable to bring him back to life, was buried with him, but saved by a serpent which revoked a herb effective for the purpose.

—(3) A fisherman of Anthedon in Bootia, who became a sea-god by eating part of a herb which Cronos had sown. Every year he visited all the coasts of Greece, attended by a train of marine monsters, and giving forth oracles to which it behaved fishermen and mariners especially to attend.

Glaucus, a genus of nudibranch Gasteropods, inhabiting the warmer parts of the Atlantic and Pacific oceans. The



Glaucus atlanticus.

Pacific oceans. The body is long, slender, celatinous, furnished with three pairs lateral outgrowths with numerous fine processes. The month has the usual horny jaws, adapted for preying on other small marine animals; the antenna or 'homs' are incon-spicuous. These small molluses—about an inch and three-quarters

long, of a blue colour, and extremely delicate and beautiful, float increly with irregular movements of their slender appendages on the surface of the water. For the nature of the outgrowths, &c., see NUDIBRANCHS.

Glaux, a genus of Prinnlaceae, without corolla. G. maritima, sometimes called Sea Milkwort and Black Saltwort, is common on muddy soils along sea-coasts of northern Europe. It was formerly used in soda-making. It is readily eaten by cattle, and is said to enhance the yield of milk from its availant leaves. its succulent leaves. It is also

piekled. Glaze. See POTTERY.

Gleaning. In conformity with the positive command contained in the Mosaic law to leave the gleanings of the harvest to the gleanings of the harvest to the poor and to the stranger (Lev. xix. 9 and xxiii. 22), there has been almost every-where a popular feeling to the effect that the farmer was not entitled to prevent the poor from gathering what the reaper had left behind. In England the custom of gleaning had very nearly passed into a legal right, for in an extra judicial dictum of Lord Hale it is said that those (Glaux maritima), who enter a field for this pur-



pose are not guilty of trespass, and Blackstone seems disposed to adopt his opinion; but the Court of Common Pleas has since decided that the or common the privilege as a right. The custom still exists in England, though it is often restricted to the wives and children of the harvesters. In Scotland the law has decided that the poor possess no right to glean, and that the farmer may exclude them from his fields.

Glebie Adscripti (Lat., 'attached to the soil') from the 4th century onwards were in the Roman empire the cultivators of the soil, who, though personally free, were inseparably attached to the land they cultivated. They paid a fixed rent in kind to the owner of the domain, and, when he retained any land in his own hands, they were generally under the obligation to render him free a determinate amount of labour to till it. If the land was sold, they still remained attached to it. The Helots (q.v.) of Sparta were also gleba adscripti.

Glebe (Lat. gleba, 'a clod or lump of earth'), the land belonging to an ecclesiastical benefice, or from which the revenues of the benefice arise. The assignment of glebe-lands was formerly held to be of such absolute necessity that without them no church could be regularly consecrated. The fce-simple of the glebe is held by the law of England to be in abeyance—that is to say, without an owner, in con-templation of law; but after induction the free-hold of the globe is in the parson, and he possesses nost of the powers of a proprietor, with the exception of the powers of a proprietor, with the exception of the power of alienation. The quantity of land to be assigned is not fixed by any general rule of law; and the glebe-lands of the parochial clergy vary considerably in extent. Previous to the Reformation the clergy possessed certain powers of alignation at company laws and it a high particular to the property of the prope of alienation at common law; and if a bishop with the assent of his chapter, or an abbot with the assent of his convent, or the like, alienated glebelands, the deed would not have been void, because the fee-simple was in the holder of the benefice for the time being; but by 1 Eliz chap, 19, and other statutes of the same reign, all grants, feofiments, conveyances or other estates shall be utterly void and of none effect, notwithstanding any consent or confirmation whatsoever. Subsequent statutes preseribe and regulate the modes in which globe-lands Power has been given to may be dealt with.

exchange glebe houses and lauds; and by the Tithe Commutation Act (1836) the Tithe Commissioners (since 1882 Land Commissioners) were empowered to ascertain and define the boundaries of the glebelands of any benefice, and also, with consent of the ordinary and patron, to exchange the glebe-lands for other lands within the same or any adjoining parish, or otherwise conveniently situated. The subsequent Act 17 and 18 Vict. chap. 84 moreover provides that the incumbent of any benefice entitled to glebe shall, with such consents as are specified in the act, be entitled to ames such glebe or other lands by deed to any church or chapel within the parish, district, or place wherein such glebe or land is situate. Glebe-lands are exempt from tithe; they are also excepted out of the acts which forbid the beneficed elergy to engage in agriculture and trade. If an incumbent dies after sowing his glebe-land his personal representative is entitled to the crop. The Glebe Lands Act (1888) provides facilities for the sale of glebe with the approval of the Land Commissioners. See Phillimore's Ecclesiastical

tilebe in Scotland.—In Scotland, as in England, a glebe forms, as a general rule, a portion of every ecclesiastical benefice of the Established Church, and is thus an addition to the stipend, and sometimes a very important one. Ministers in royal burghs, however, cannot claim globes, unless in cases where there is a landward district attached to the parish. Evon then, if there are two ministers, to the parish. Even then, if there are two ministers, only the first can claim a glebe. Where parishes are disjoined, or separated into two portions, moreover, it does not necessarily follow that the portion erected into a new parish shall contain a glebe. By 5 Geo. LV. chap. 72, provision is made for payment of compensation out of the public revenue, in lien of manse and glebe, to ministers whose stipends do not exceed £200. If there are arable lands the glebe mass took he less than four governments. lands, the glebo most not be less than four acres. If there is no arable land, the minister is entitled to sixteen soums of grass adjacent to the church. A soum is as much as will pasture ten slicep or one eow, so that the actual extent varies with the richeow, so that the actual extent varies with the reinness of the sail and consequent quality of the pasture. The preshytery pussesses the power of designing glebes, the heritor from whose property the glebe is designed having recourse against the other heritors of the parish. By 1372, chap. 48, it is enacted that the glebe shall not be alienated by the meanthment. As the act limits its problibition to make the definient of the problem. to such alienation as may be detrimental to the successor of the incumbent, it has been doubted whether the latter might not fen. The court, however, has been very unwilling to sanction this proceeding. When the church is changed, or transproceeding. When the church is changed, or transported, as it is called, to a new site, the court will authorise the sale or exeambion of the glebe, but such exeambions must be sanctioned by the presbytery. Where minerals are found on the glebe, they are worked under the superintendence of the heritors and presbytery for the behoof of the incumbent. Trees growing on the glebe are thought to belong to him. Glebe-lands are usually teind-free. See TEINDS.

Glee, a species of vocal composition peculiar to England, for three or more voices, and in one or more movements, generally maccompanied and sing by male voices, though these conditions are not obligatory. It is distinguished from the made the conditions are not obligatory. not congatory. It is distinguished from the madrigal by its modern tonality, larger number of musical motives, and a less extensive development of them; and in being written for single voices to each part. This last point, however, is now frequently disregarded. Its independent part-writing also distinguishes it from the modern part-song, which is usually in civally between that the rouse. which is usually in simple harmony, but the name is often given to such—e.g. Sir H. Bishop's 'Glees.'

The glee flourished during the later half of the 18th century and the earlier part of the 19th. Samuel Webbe (1740–1816) is probably its greatest master. Among his best-known glees are 'When Winds brenthe Soft' and 'Glorious Apollo,' the latter of which was always the first to be sung at the meetings of the now defunct Glee Club (1783–1837). 1857). Other writers of the first rank are R. J. S. 1857). Other writers of the first rank are R. J. S. Stevens (1757-1837), the composer of 'Ye Spotted Snakes,' 'The cloud-capt Towers,' and 'From Oberon in Fairyland;' John Wall Callcott (1766-1821), a most prolific composer, and anthor also of a well-known Grammar of Music, of whose glees 'The Red-cross Kuight,' 'To all you Ladies,' and 'It was a Frint of Orders Grey,' may suffice as specimens; with whom may be mentioned the names of Horsley, Spotforth, Cooke, Paxton, Attwood, and Lord Mornington. See W. A. Barrett's English Glees and Part-songs (1886).

Gleet. See GONORRHEA.

Gleig, George Robert, writer, born at Stirling, 20th April 1796, was the son of the Bishap of Brechiu. He entered the army, and served in Spain (1813) and in America (1814). He subsequently (1820) took orders, and became chaplaingeneral of the army (1846) and inspector-general of pilitary schedules. of military schools, posts which he held until 1875. He deserves mention as the author of the story The Subaltern (1825), founded on incidents of the Peninsular war. He wrote several other novels, none equal to the first, and several volumes of military history and biography, as Camputyns at Washington and New Orleans (1847), Lives of Warren Hastings (1841), Clive (1848), and Wellington (1862), &c. He died 9th July 1888, near Winehtfield, in Hampshire.

Gleim, JOHANN WILHELM LUDWIG, German poet, born at Ermslehen near Halberstadt, 2d April 1719, and died at Halberstadt on 18th February 1803. Besides writing a good deal of moderate poetry, he won for hinself the affectionate appellative of 'Father Gleim,' on account of the encouragement and assistance he lent to the fledgling poets and poetasters of the day. But his efforts to encourage German literature, though sincere and well intentioned were often the reverse of indictional poets. well intentioned, were often the reverse of judicious and discriminating. His patriotic Lieder cines
Preussischen Grenadiers, by their genuineness of
feeling and force of expression, do rise above the
general level of his other productions—odes in
juitation of Managamul Approximations—design imitation of Horace and Anaereon, rhymed fables and runances, and songs. His collected works appeared at Halherstadt in 7 vols. in 1811-13, with supplementary volume in 1841 (Leip.). See Korte, Gleims Leben (1811).

Gleiwitz, a town of Prussian Silesia, pleasantly situated on a small affluent of the Oder, 40 miles SE. of Oppeln, contains iron and other metal foundries, machine, glass, and iron works, &c. Pop. 17,658.

Glenalmond, a romantic valley of Perthshire, in Scotland, much visited for its scenery, and for Ossian's grave—the subject of Wordsworth's verses on the 'Narrow Glen.' It is the seat, 12 miles WNW. of Perth, of Trinity College, Glenalmond (1847), a public school of about 100 boys, whose buildings have been to some extent remoduced in those of Trinity College, Haufford II C those of Trinity College, Hartford, U.S.

Glencoe, a valley of northern Argyllshire, descending 7½ miles west-by-northward from a 'col,' 1011 feet high, to salt-water Loch Leven, 2 miles ENE of Ballachulish. It is traversed by the Coe (or Cona of Ossian); and it is flanked by conical mountains, the Pap of Gleneoe (2430 feet) the most prominent, Benveedan (3766) the Ioffiest. Of many descriptions of Glencoe the best are by Dorothy Wordsworth (1804); by Maeaulay (1849),

who saw it both in rain and in sunshine, and ealls who saw it both in rain and in sunshine, and ealls it 'the very valley of the shadow of death;' and this by Charles Dickens (1841): 'Glencoe itself is perfectly terrible. The pass is an awful place. It is shut in on each side by enormous rocks, from which great torrents come rushing down in all directions. In amongst these rocks, on one side of the pass (the left as we came from Kingshonse), there are some of alone high un which form such there are seores of glens high up, which form such hannts as you might imagine wandering in in the very beight and madness of a fever. They will

live in my dreams for years.'
In 1691 the Edinburgh authorities issued a proclamation exhorting the clans to submit to William and Mary, and offering pardon to all who before 31st December would swear to live peaccably under the government. All the chiefs submitted except M lan, the head of the Macdonalds of Glencoe, whose submission was delayed by unforeseen causes till 6th January 1692. magistrate before whom he took the oath of allegiance transmitted a certificate to the Council at Edinance transmitted a certificate to the Council at Edinburgh, explaining the circumstances of the ease. However, on 16th Jannary, King William signed an order, ending: 'If M'Ean of Glencoe and that trybe can be well separated from the rest, it will be a praper vindication of the public justice to extipate that sect of thieves.' So on 1st February 120 soldiers—Campbells mostly, and commanded by Captain Campbell of Glencoe and telling the patives that they came by Captain Campbell of Genryon—marched to Glencoe, and, telling the natives that they came as friends, and merely wanted quarters, for twelve days lived in the glen. Glenlyon, while visiting daily at the chief's house, employed himself in observing every pass by which escape was possible, and reported the result of his observations to Lieutenant-Colonel Hamilton, who was approaching the the William with 100 more tracks. ing from Fort-William with 400 more troops. 18th was fixed for the massacre, and on the night of the 12th Glenlyon was supping and playing at cards with those whom he purposed to butcher. At five in the morning the murderous work began, and day broke on thirty-eight corpses, including those of at least one woman, an old man of seventy, and a boy of four. But, Hamilton not having come up in time, the passes were open, and some 150 men, and probably as many women, escaped—in many cases only to perish from cold and lunger among the snow in the high mountaingorges. The luts were fired, and then the troops marched away, taking with them a thousand head 13th was fixed for the massacre, and on the night narched away, taking with them a thousand head of cattle and sheep and horses.

The prime movers of this deed of infamy were a Lowland statesman and a Highland chief, Sir John Dalrymple, Master (and afterwards Viscount and first Earl) of Stair, and John Campbell, Earl of Breadalbane. The one was actuated by chagrin at the failure of his scheme for pacifying the Highlands, the other by personal animosity. As for King William, Macaulay pleads that M'Ian's sub-Ming Wilham, Macatlay pleads that Arlan's submission had been kept from him, that he knew the Macdonalds only as thieves and rebcls, and that by 'extirpation' he certainly never meant them to be murdered in their sleep. Anyhow, a royal commission (1695) found that his instructions 'offered no warrant for the measure;' and there the affair ended. In 1884 a monument was erected to mark the scene of the massacre. See the histories of Macaulay and Hill Burton, and Paget's Paradoxes

and Puzzles (1874).

Glendower, or GLENDWR, OWEN, a Welsh chief who headed the struggle of the Welsh for the recovery of their independence in the reign of the recovery of their independence in the reign of Henry IV. of England, was descended from Llewelyn, the last Prince of Wales, and was born in Montgomeryshire about 1354. He was made esquire of the body to Richard II., and remained with him until his deposition by Henry IV. in

1399, after which he retired into private life, Shortly after the accession of the new king part of Glendower's lands were seized by his neighbour, Lord Grey of Ruthin. Thereupon the Welshman, being unable to obtain rediess from the English king, took up arms in his own cause, and in 1400 commenced operations by seizing the estates of Lord Grey. The king ordered his subjugation, and granted his estates to his brother, the Earl of Somerset Then for two years Glendower carried on a gnerilla warfare against the English marchers, backed up at times by the forces of Henry himself. In 1402 he drew Lord Grey into an ambush, and took him prisoner. In this same year Sir Edmund Mortimer, the nucle of the Earl of March, was also captured by Glendower in a battle in which 1100 of Mortimer's followers were left dead upon the field. Both Grey and Mortimer married daughters of the Welsh chieftain (now formally proclaimed Prince of Wales), and with him formed the coalition with Harry Percy (Hotspur) against Henry of England. That coalition ended in the battle of of England. That coalition ended in the battle of Shrewsbury, in July 1403, in which the English king gained a decisive victory, Hotspur being amongst the slain. In June of the following year Glendower entered into a treaty with Charles VI. of France, who in 1405 sent a force to Wales to act against the English. Meautime, in the spring of 1405, Glendower had been twice severely defeated by Prince Henry (V.) of England. The Welsh prince nevertheless kept up a desultory wurfare during the remaining years of his life. He never submitted to English rule, and is believed to have died peacefully in Monmouthshire after 1416. The popular idea of him is presented in Shakespeare's King Henry IV. King Henry IV.

Glenela is a shallow river of Australia, rising in the Grampians in the south-west part of Victoria, and entering the Southern Ocean between Capes Northumberland and Bridgewater, at the boundary between South Australia and Victoria,

after a course of 281 miles.

Glenelg, Charles Grant, Baron, politician, son of an East India director, was born in India in 1778. Entering parliament in 1807, he was from 1819 to 1822 Chief-secretary for Ireland under Lord Liverpool; from 1823 to 1827 Vice-president, and from 1827 to 1828 President of the Board of Trade, under Canning; from 1830 to 1834 President from 1834 to 1839 Colonial Secretary, under Lord Melbourne. Glenelg, having approved of Lord Durham's 'ordinance' in reference to the Canadian rebels of 1838, was compelled to resign in 1839, and from that time retired from public life. He was elevated to the peerage in 1835, and died at Cames, 23d April 1866. He is sumetimes called the last of the Canningites.

Glenfinnan, a Highland glen in Inverness-shire, 18 miles W. of Fart-William. Here, on 19th August 1745, the claus gathered under Prince Charles Edward's banner, and here in 1815 was erected to his memory a tower bearing an inseription in Gaelic, Latin, and English.

Glengarry, a Highland glen in west Inverness-shire, through which the Garry winds 19 miles eastward, from Loch Quoich to Loch Oich, 8 miles SW. of Port Angustus. It was the home of the Macdonnells from the beginning of the 16th century. The last chief, who died in 1828, is considered to have been the prototype of Fergus MacIvor in Waverley.—There is another Glengarry, in the north-west of Perthshire, traversed by the Highland Railway. Its Garry River falls into the Tummel.
—For the Glengarry Cap, sec BONNET.

Glenlivet, the valley in Banfishire of Livet Water, which runs 14 miles north-westward till, at

a point 5 miles S. of Ballindalloch station, it falls after a total descent of 1600 feet into the Aven, itself an affluent of the Spey. Its population still is largely Catholic. Since 1824 its 200 whisky bothics have given place to one celebrated distillery. In the battle of Gleulivet or Alltacoileachan (4th October 1594) 10,000 Protestants under the Earl of Argyll were routed by the Catholic insurgents under the Earl of Huntly.

Glenroy, PARALLEL ROADS OF. The Roy is a small stream in the district of Lochaber, Inver-The Roy is ness-shire, having a course of about 15 miles, and falling into the Spean at Inverroy, opposite to Ben Chlinaig, the eastern spur of Ben Nevis. steep narrow valley through which the Roy runs is remarkable for baving its slopes indeuted with thee shelves, which are everywhere perfectly horizontal and parallel to each other, in each case the line on the one side of the glen corresponding exactly in elevation to that on the other. The granitie and metamorphic rocks, of which the mountains are composed, are covered with a greater or less thickness of angular fragments and carth, and an examination of the shelves shows that they are worn out of this soft alluvial coating. They almost invariably form a gentle slope from the hillside, and are from 3 to 30 feet wide. The protrusion of the rocky body of the mountain, and the furrows of mountain-torrents, break their continuity, but with these exceptions one or more of them may be traced along the whole valley. The highest, which is 11391 feet above the sea-level, is easily followed from the watershed between the Roy and the Spey (which is at the same elevation) along both sides of the valley, as far down as the point at which the valley narrows above Glen Glaster. The second shelf is 80 feet lower, runs Glaster. The second shelf is 80 feet lower, runs parallel with the first all round the head of the valley, and is continued farther down until it includes Glen Glaster. The third line is 212 feet lower than the second; it may be traced along both sides of Glenroy, and round the month of the glen into the valley of the Spean, whose sides, at the same elevation of 847 feet, are marked from within 3 miles of the river Locby up nearly as far as Loch Laggan. Many attempts have been made to explain the origin of these remarkable shelves. Their forming somewhat level roads around the valley originated the popular notion that they were made for the convenience of the heroes whose exploits are sung by Ossian. Playthat they were made for the convenience of the heroes whose exploits are sung by Ossian. Playfair, in 1816, supposed they were aquednots for artificial irrigation. Macculloch believed them to be the shore-lines of fresh-water lakes, which gradually washed away their harriers, remaining for a longer space at the height of the various shelves. This view may now be regarded as accepted, with the additional suggestion of Agassiz that the barrier of day keeping heak the water was that the barrier or dam keeping back the water was formed of glacier ice, the lake having lowered in level as the barrier gradually melted away. See Robert Chambers's Ancient Sea Margins (1849); Tyndall, in the Popular Science Review (1876); Macfadzean's Parallel Roads of Glenroy (1883); and A. Geikie's Scenery of Scotland (2d ed. 1887).

Glen's Falls, a post-village of New York, on the Hadson, 60 miles by rail N. of Albany, with sawmills and machine-shops, and a quarry of black marble. The river, which is crossed by a bridge, here falls about 50 feet, and is very picturesque. Pop. (1880) 4900.

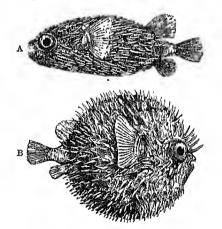
Glenshiel, a Highland valley of Ross-shire, 58 miles SW. of Inverness. Here, on 11th June 1719, 1500 Jacobites and 274 Spaniards encountered 1600 Hanoverians. The fight was indecisive, but next day the Highlanders dispersed, and the Spaniards had to surrender. Never since then,

except for the bloodless French landing in Pembrokeshire (1797), has a foreign force set foot upon British soil.

Glentilt, in north Perthshire, the deep narrow glen of the trontful, impetuous Tilt, which issues from Loch Tilt (3 by 2 furlongs; 1650 feet), and runs 16 miles sonth-westward, receiving the larger Tarf Water and Fender Burn, until at Blair Athole it falls into the Garry. It is traversed by the footpath from Blair-Athole to Braemar. Huge Benglo (3671 feet) flanks its left side. Glentilt is classic ground to the geologist, as having furnished evidence for the Huttonian or demudation theory. A famons hunting ground, too, it has memories of James V., Mary, and Victoria; nor is its right-of-way ease (1845) yet forgotten.

Gliddon, George Robins, Egyptologist, was born in Devonshire in 1809, and resided for many years in Egypt, where his father was United States consul at Alexandria, and he himself became vieconsul. He afterwards lectured in America on Egyptian antiquities, and died at Panama in 1857. His works include, besides his Ancient Egypt (1850), which was very popular in America, Types of Mankind (Phila. 1854), written in conjunction with Dr J. C. Nott, and containing papers by Agassiz and others, and Indigenous Races of the Eurth (1857), with Dr Nott and others.

Globe-fish, a name given to a number of peenliar Teleostean fishes forming a sub-family (Tetrodontina) of the order Pleetognathi. The best-known genera are Tetrodon and Diodon, which may be readily distinguished from one another by the structure of the jaws, which are cleft in the former, undivided in the latter, thus producing the appearance (which the names emphasise) of four and two teeth respectively. Both are represented by numerous species in tropical seas. One species of Tetrodon (T. lago-cphalus) has been found on British coasts. The globe-fishes are so named from their curious power of filling their bodies with air, and thus distending



A, Globe-fish (Diodon muculatus); B, the same inflated.

them till they are nearly globular. The distension takes place chiefly in the osophagus, and the fish, therefore, when inflated, turns over and floats on its back at the surface of the water. In this position it can not only move forward, but can turn to either side by the aid of its pectoral fins. The globe-fishes have short, thick bodies, sharp, hard beaks, and well-developed fins. The smallest are only a few inches in length, while the Sea-hedgelog (Diodon hystrix) measures two feet. The skin is scaleless, but in it are embedded spines which vary

greatly in size and number in the different species. In some they are movable, and are erected with the distension of the body. Darwin, in an account of one species (D. antonuctus), says that it can secrete from the skin of its belly, when handled, a most beautiful carmine-red substance, which stains ivery or paper permanently. He also states that a Diodon has frequently been found floating, alive and distended, inside the stomach of a shark, and that one has even been known to eat its way through the sides of the monster, thus causing its death. Many of the glabe-fishes are highly poisonous, the poison varying in intensity in different individuals, in different localities, and at different times of the year. The food of these fishes consists of corals, molluses, and emstaceans, for breaking which their hard beaks are well adapted. Nearly related to the Tetrodontina are the Triodonts (to which the name globe-fish might also be extended) and the pelagic Sun-fishes (q.v.). All are included in the family Gymnodontes. See Günther, Study of Fishes (Edin. 1880).

Globe-flower (Trollins), a small palearctic genus of Rannenlaceae, with a globe of large showy sepals enclosing the small inconspicaous linear petals. The common yellow globe-flower (T. europeus; Scottice Luckengowan) is one of the finest ornaments of moist grounds in elevated districts of northern Emape and in the Alps. It is cultivated in flower-gardens. The orange globe-flower (T. asialicus) is also common in gardens.

Globes. A globe is a round or spherical hody (see SPHERE), and in the singular number the word is often used to signify the earth, as in the phrase, the terraqueous globe; but by 'globes,' or 'the globes,' we usually mean a pair of artificial globes used as a part of school-room apparatus. These globes are usually below spheres of card-board, coated with a composition of whiting, glue, and oil, upon which paper bearing certain defineations is laid. On one of the pair—the celestical globe—are represented the stars, so placed that, to an eye supposed to observe them from the centre of the globe, their relative position and distance correspond to those actually observed; while on the terrestrical globe the distribution of land and water, the divisions and subdivisions of the former, together with a few of the most important places, are laid down in the positions corresponding to those which they actually occupy on the surface of the earth.

Globes of india rubber and gutta percha have also been made, and others of thin paper, to be inflated and suspended in a school-room. Betts's paper globes fold up when not in use. Embossed globes show, in exaggerated relief, the elevations and depressions of the earth's surface. Compound globes, including the eclestial and terrestrial, are made with an outer glass sphere for the celestial, and orrery mechanism to show the varying relative positions of the sun and moon, &c. As school-room apparatus, globes are used for the purpose of illustrating the form and motion of the earth, the position and apparent motion of the fixed stars, and for the mechanical solution of a number of problems in geography and practical astronomy. For this purpose each globe is suspended in a bruss ring of samewhat greater diameter, by means of two pins exactly opposite to each other—these pins forming the extremities of the axis round which it revolves, or the north and south poles. This brass circle is then let into a horizontal ring of wood, supported on a stand, as represented in the article Armillary Sphere; in which the lines drawn on the surface of globes are also explained. The globes in common use in schools are 12 inches in diameter; those found in private libraries are more frequently 18 inches.

The earliest globe made in England was that by Molyneux in 1592, of which an example is still in the library of the Middle Temple.

At the Paris Exhibition of 1889 one of the exhibits was a globe ingeniously designed to show on a realisable scale the proportions of the earth. The globe is on the scale of one millionth of the earth in all respects. The circumference is 40 metres, that of the earth being 40,000 kilometres; the diameter 12'732 metres, corresponding to the 12,732 kilometres of the earth's diameter; and accordingly a metre on the globe represents 1000 kilometres on the earth's surface. The flattening at the poles, which would have amounted to but 21 millimetres, has been disregarded in this globe as being inappreciable. For the same reason the irregularities of the earth's surface are only indicated on the globe by colour, like the other features. The globe, the framework of which is solidly built of iron and wood, is capable of being put in motion. The globe in Leicester Square, London (1851-61), was 60 feet 4 inches in diameter.

Globigeri'nn, an important genus of Foraminifera (q.v.), the shells of which form a great part of the calcarcons ooze or mud found in the bed of the ocean, just as they have formed in the past a large percentage (sometimes 90 per cent.) of chalk-deposits.

Globulins are a group of Proteid (q.v.) substances closely allied to Allminen (q.v.; and see ANIMAL CHEMISTRY), but differing from it in that they are not soluble in water unless it contain a small proportion of a neutral salt, such as enumon salt, and that they are precipitated by earbonic acid, and (except vitellin) by a saturated solution of common salt. The most important globulins which occur in animal tissues are: globulin (proper) or crystallin, in the crystalline lens of the eye; fibrinoplastin or paraglobulin and fibrinogen, in blood, serous fluids, &c.; myosin, in muscle; vitellin, in the yolk of egg. Precisely similar bodies occur also in the vegetable kingdom.

Globulite, the name given by Vogelsang to mimite Crystallites (q.v.) having a spherical, droplike form. See languages.

Globus Hystericus, or Ball in the Throat, the name applied to a peculiar sensation described under Hysteria.

Glockner, or Gross-Glockner, the highest peak of the Norie Alps, is situated on the boundary between Tyrol, Carinthia, and Salzburg, and is 12,458 feet in height.

Glogau, or Gross-Glogau, a town and fortress in Prussian Silesia, on the left bank of the Oder, 60 miles NNW, of Breslan hy rail. It is an important centre of trade, and has wood markets of some note. Manufactures of agricultural implements, pottery, tobaceo, sugar, &c. are carried on. There is also a cartographical institute. Pop. (1875) 18,002; (1885) 20,028, including a garrison of above 3000 men. Glogan was a prosperous fortified town in the 11th century. From 1252 till 1476 it was the capital of a duchy, transferred then to Bohemia. The town suffered severely during the Thirty Years' War, and was besieged in 1741, 1806, and 1813-14. See its History by Berndt (2 vols. Glog. 1879-82).

Glommen, or Stor-Elv (i.e. 'great river'), the largest river in Norway, issues from Lake Aursund, at 2339 feet above sea-level, and winds 350 miles southward to the Skager Rack at Frederikstad. Its course is interrupted by frequent waterfalls, the last, with a descent of 74 feet, being the Sarpsfos, 7 miles from the mouth. Its drainage basin measures 15,926 sq. m. It is only navigable a few miles above and below Sarpsfos. Its most

important affluent is the Vormen from Lake Mjösen on the right.

Gloria. See Doxology.

Gloriosa, a genus of Liliaceæ, of which the best known species, G. superba, a native of India, is a herbaceous perennial with a weak stem, alternate simple leaves, terminating in tendrils, and very beautiful flowers, finely coloured with red and yellow. The root-stock is poisonous, but is washed for its starch, like manioe.

Gloss (Gr. qbössa, 'language'), an explanation of such difficulties in a text as are merely verbal, and not relating to the matter itself. The word of such difficulties in a text as are merely verbal, and not relating to the matter itself. The word was originally applied to any obsolete, foreign, provincial, dialect, or technical word, or use of a word, collections of such being called glossai. In the Alexandrian period these became common, their subjects the works of Houer and other early poets. Of such glossarians may be named Philetus of Cos. Zenodotus. Aristophanes of Ryzantium of Cos, Zenodotus, Aristophanes of Byzantinn, Aristarchus, Crates of Mallos, Apion, Elius Herodianus, Hesychins, Photius, Zonaras, and Snidas. Must of the Rabbinical writors have done the same work for the Hobrew text; so that it would be difficult to name any in particular as Hebrew glossatores. The chief glossatores of the Latin Vulgate are the celebrated Walafridus Strabus, in the 9th century, and Auselm of Laon, who continued Walafried's work (circa 1100). In Roman and canon law the practice of introducing Roman and canon law the practice of introducing glasses was of early origin, and probably was an initation of the biblical glasses. Among jurists the glass was not purely verbal, but regarded the true interpretation of the law, and in some cases it was held to be of equal authority with the text itself. From the position which it occupied in the MS, being generally written between the lines of the text and on the margin, it was called glassa intertinearis. The glass of the Roman law is written in very pure Latinity, that of the canon law in the Latinity of the medieval school.

Glassitis, inflammation of the Tongne (a.v.).

Glossi'tis, inflammation of the Tongue (q.v.).

Glossop, a market-town of Derbyshire, amid bleak but picturesque hills, 13 miles ESE of Man-chester, and 24 WNW. of Shellield. It is the chief seat of the cotton manufacture in Derhyshire, and has also woollen and paper mills, dysing, bleaching, and print works, and iron-foundries. Near it is Glossop Hall, the seat of Lord Howard of Glossop. The town was incorporated in 1866. Pop. (1871) 17,046; (1881) 19,574.

Glossopetrie, once much-debated fossils, now known to be sharks' teeth. See SHARK.

Glottis. See LARYNX.

Glottology, a word proposed by Professor Sayee in 1874 as an alternative for Comparative Philology.

Gloucester, the capital of Gloucestershire, a parliamentary and county borough, is pleasantly situated on the left bank of the Severn, which here becomes tidal. It is 114 miles by rail (by road 106) WNW. of London, 38 NNE of Bristol, and 55 SSW. of Birmingham. The Caergloui of the Britons, and Glevum of the Romans, whose eruciform ground-plan survives in the four main streets, Gleauanceastre or Gloneester was the seat successively of a numery (981), a monastery (821), and a great Benedictine abley (1022). The last was suppressed in 1539; and its church two years later became the eathedral of the new see of Gloucester—a see conjoined with that of Bristol in 1836, but to be disputed by an extraoscal in 1884. Appendix to be disunited by an act passed in 1884. Among its thirty-one holders have been the martyr Hooper, the Romanist Goodman (1625-56), Warburton, and Ellicott. Built between 1088 and 1498, and restored since 1853 by Mr Walter and Sir G.

G. Scott, the cathedral measures 420 feet by 144 aeross the transent, and though substantially Norman-erypt, chapter house, and the interior of the nave are Norman—in general character is Perpendienlar. Its pinnacled central tower (1457) rises 225 feet, and contains the 'Great Peter' bell, weighing 3 tons 2 cwt. Other noteworthy features are the lofty round piers of the worthy features are the lotty round piers of the nave, the east window (the largest in England—72 by 38 feet) with its splendid stained glass of 1350, the bog-oak effigy of Robert of Normandy, the exquisite eanopied shrine of Edward II., the statue of Jenuer, and a group by Flaxman, the lierne vaulting of choir and Lady chapel, the 'whispering gallery' in the triforium, and the matchless fangallery' in the triforium, and the matchless fan-vaulted cloisters (1351-1412; see Fan-Tracery). At Gloneester alternately with Woreester and At Glonester alternately with Worester and Hereford are held the festivals of the 'Three Choirs.' A new episcopal palace was built in 1862; the picturesque deanery is the old prior's lodge; and other buildings are the 12th-century West Gate, the New Inn (built about 1450 for pilgrims), the Tolsey or guild-hall, the shire-hall (1816), the information of the control the Tokey or guild-half, the shire-half (1816), the infirmary (1755), the county lunatic asylum (1823), the King's or College school, the Crypt grammar-school, the Blue-coat hospital, and a theological college. There is a cross (1868) to Hooper, and a statne (1880) of Raikes, the founder of Sunday schools; in the public park is a chaly beate spring, which was discovered in 1814. Cloth-working, pinnaking, and bell-founding all belong to the past; and the converge of Clovester is now more inand the commerce of Gloneester is now more important than its manufactures—chemicals, soap, natches, railway plant, shipbuilding, &c. The Glouester and Berkeley Caual, completed in 1827 at a cost of £500,000, is described in Vol. II. p. 699. The number of vessels entering the port has almost rabled their a vessels entering the port has almost trebled during the last thirty years; the imports include corn and timber, the exports agricultural produce and the minerals of the Forest of Dean. Since 1885 Gloncester has returned only one member. Pop. (1841) 14,152; (1871, as extended) 31,844; (1881) 36,521. Often visited by royalty, from the Conqueror's time to Victoria's, Gloncester was also the meaning also as faith traditional to was also the meeting place of eight parliaments. In the Great Rebellion (1643) it held out successfully against Charles I. till Essex relieved it. Annog its natives have been (doubtfully) Robert of Gloucester, whose metrical chronicle (1271) was edited in 1888 by Mr Aldis Wright; Taylor, the water-poet; Whitfield, and Raikes. See works by Rudder (1781), Britton (1829), F. Bond (1848), and Waller (1856); also Minray's Western Cathedrals (1856). (new ed. 1874).

Gloucester, a port of entry of Massachusetts, on the south side of Cape Ann peninsula, 28 miles NNE. of Boston, with which it is connected by rail, and with an excellent harbour. Its industries are chiefly connected with the cod and mackerel fisheries, which employ several thousand men; but it has also a large trade in the granite quarried here, and manufactures of anchors and railroad iron, besides the building of schooners and fishing-boats, and the import of salt, coal, and lumber from Europe and Canada. Gloncester was incorporated as a town in 1642, and made a city in 1874. Pop. (1880) 19,329; (1885) 21,713.

Gloucester City, a town of New Jersey, on the Delaware, opposite Philadelphia, with which it has half-hourly communication by steamboat. It contains ironworks and several cotton factories. Pop. (1885) 5966.

Gloucester, DUKES AND EARLS OF. (1) ROBERT, Earl of Gloncester (died 1147), a natural son of Henry I., the principal supporter of his sister Matilda and her son Henry in their contest state that the Freight through test against Stephen for the English throne.—(2)

Gilbert de Clare, Earl of Gloueester (1243-95), one of the most infinential nobles during the reigns of Henry III. and Edward I. At first he sided with Simon de Montfort, and helped him to gain the battle of Lewes (1264); but, afterwards quarrelling with Simon, he made common eause with Prince Edward and won for him the battle of Evesham (1265).—(3) Thomas of Woodstock, Duke of Gloueester (1355-97), the youngest son of Edward III., was from 1386 to 1389 the virtual ruler of the country. He was put to death by Richard II. at Calais in 1397, on the plea that he was plotting against the king.—(4) Humphrey, Duke of Gloueester (1391-1447), fourth son of Henry IV., aeted as protector of the realm during the minority of Henry VI. He was arrested for high-treason on 18th February 1447, and five days later found dead in bed. He was a patron of learning, but reckless and foolish in his public conduct.—(5) Richard, Duke of Gloueester, became King Richard III. (4, v.).—(6) Henry, Duke of Gloueester (1689-60), third son of Charles I.—(7) William, Duke of Gloueester (1689-1700), eldest son of Queen Anne.—(8) William Henry (1743-1805), George III.'s brother, created Duke of Gloueester and Edinburgh in 1764.—(9) His son, William Frederick (1776-1834).

Gloucestershire, a west midland county of England, lying around the lower course and the estuary of the Severn, and bounded by the counties of Monmouth, Hereford, Worcester, Warwick, Oxford, Berks, Wilts, and Somerset. With a maximum length and breadth of 64 by 43 miles, and an area of 1258 sq. m., it still offers a very irregular outline, though in 1844 some outlying nortions were annexed to Wilts, Warwick, and Worcester, and, in like manner, detached pieces of wordester, and, in the intimer, detached pices of neighbouring counties, but enclosed by (Honcestershire, were incorporated in that county. There are three well-marked divisions, each with its natural characteristics—the Hill, the Vale, and the Forest. The first is formed by the Coteswold Hills (q.v.), whose highest point is Cleeve Hill (1134 feet); the second, comprising the Vales of Gloucester and Berkeley, by the low rich meadow-lands lying along the Severn; and the third, to the west of the Severn, by the Forest of Dean (q.v.). The principal rivers are the Severn, the Wye, the Upper and Lower Avon, and the Thames, which receives all the waters east of the Cheswolds. The main rocks, proceeding westward, are Oelitic (Coteswolds), Liassic, New Red Sandstone, and Carboniferous; the soil is thin ou the hills, but produces good pasturage for sheep, while the lower grounds abound in excellent grass and arable land. Permanent pasture and corn-erops occupy more than two-thirds of the entire area. Gloneestershire is famous as a dairy country, and raises large numbers neighbouring counties, but enclosed by Gloncesterfamous as a dairy country, and raises large numbers of cattle. The well-known double and single Glo'ster cheese is produced in the Vale of Berkeloy (see CHEESE). The orchards yield great quantities Of cider; and woods and plantations cover 82 sq. m. Building stone is plentiful; and there are two rich coal-fields—that of Bristol in the SW., and the Forest of Dean in the W.; but the ironworks are of less importance than formerly. The woollen manufacture is of ancient standing. Gloneestershire since 1885 contains the parliamentary boroughs of Gloneester and Cheltenhain, with part of Bristol, and five parliamentary divisions—Mid or Strond, North or Tewkesbury, East or Circneester, Forest of Dean, and South or Thornbury. Its county council consists of 80 members. Pop. (1801) 250,723; (1841) 431,495; (1881) 572,433. Gloucestershire has a wealth of antiquities—pre-Gloucestershire has a wealth of antiquities—pre-historie, Roman, Anglo-Saxon, and medieval. The most noticeable of these, as well as the chief events in its history, its industries, and the names of its

worthies, are noticed under the towns, Tewkesbury, Berkeley, Gloucester, Circncester, Bristol, Fairford, &c. See Worth's Gloucestershire (1888), and larger works there eited.

Glover, Richard, an English poet, was born in London in 1712, and was educated at Cheam, in Surrey. He was a prosperous merchant in his native city, and sat in parliament for some years as member for Weymonth. In 1737 he published Leonidus, an elaborate poeu in blank verse, which was increased from nine to twelve books in 1770, and followed by a posthumous sequel, the Atheniad (1788). These poems are not deficient in dignity and elevation of tone, but are turgid and heavy, and are now almost as well forgotten as their author's tragedies, Boulicea (1753) and Medea (1761). His ballad, Admiral Hosier's Ghost, long enjoyed a factitions reputation. Glover was an upright, fearless, and patriotic citizen. He died in 1785; and in 1813 his diary was published.

Gloversville, a post-villago of New York, 53 miles NW. of Albany by rull, with large manufacture of buckskin and other gloves. Pop. 7133.

Glover Tower. See Sulphumic Acid.

Gloves. The glove (Anglo-Saxon glof) which forms the ordinary hand covering is, both from its history and symbolic import, one of the most interesting of all articles of dress. Its use reaches back to a remote antiquity, for we are told in the Odyssey that Lacrtes, the farmer-king, were gloves to protect his hands from the thorns. Xenophon also sneers at the Persians for wearing gloves for keeping their hands warm. In their more robust days the Greeks and Romans scorned the use of gloves; but in later times their use was not unknown in Rome. From time immemorial the glove possessed a legal significance in oriental countries in connection with the transfer of property, the handing over of the seller's glove to the purchasor being the recognised token of investiture. In this connection it is held by some that the word translated 'shoe' in Ruth, iv. 7, should more properly read 'glove,' making the passage read: 'Now this was the manner in former time in Israel concerning redeeming and concerning changing, for to confirm all things; a man placked off his glove and gave it to his neighbour.' In feudal times the challenge to single combat was given by the casting down of the glove; and an ancient and more pleasing ceromonial still observed consists in the presentation of white gloves to a judge presiding over an assize at which no cases come up for trial.

The glove appears to have become a well-known article of dress in England about the 14th century, and corporations of glovers were in existence in the 15th century. In the days of (lucen Elizabeth gloves were made with gauntlets upon which much rich and elaborate embroidery was worked.

Modern gloves are of two distinct classes: (1) woven and knitted gloves, and (2) those made of leather; and the making of these constitute entiroly separate branches of manufacture. The manufacture of knitted or woven gloves is an industry allied to the hosicry trade, and the materials comprise all the ordinary libres, the most important boing silk and wool. In some cases these gloves are entirely made and finished by knitting; but in others, and in the best of such gloves, the pieces are separately fashioned and sewed together as in making leather gloves. The manufacture is widespread, but the headquarters of the thread and eloth glove trade are now Berlin and Saxony. The materials used for making leather gloves is principally the skins of deer, sheep and lambs, goats and kids, the latter being the most important, although far more 'kid' gloves are made of sheep than of kid leather. The skins for military and

other heavy gloves-doe or buck leather-are prepared by the ordinary process of tanning, or are a fine kind of chamois leather. Those for what are called dressed kid gloves are subjected to a special method of tanning, by which, under the influence of heat, and treatment with a mixture of flour, yellow of egg, and alum, the material is rendered peculiarly soft and flexible. After the leather has been properly prepared it is ent into pieces of the required size, then folded over somewhat unequally, as the back should be larger than the front. Three cuts are then made through the doubled piece to produce the four fingers; an oblong hole is cut at the bending of the fold for the insertion of the thumb-piece; the enting of this of the exact shape and size requires considerable skill. The first and fourth fingers are completed by gussets or strips sewed only on their inner sides, while the second and third fingers require gussets on each side to complete them. Besides these, small pieces of a diamond shape are sewed in at the base of the fingers towards the palm of the hand. The stitching together of these pieces requires much care, as the junction must be made as closely as possible to the edge of each piece, and yet with sufficient hold to keep the stitches from cutting through the material. A kind of vice or elamp, with minute teeth to regulate the stitches, is used for this purteeth to regulate the stitches, is used for this purpose in the making of hand-sewn gloves, by which method all the finest gloves are stitched. Sewing-machines are applied for the ornamental or embroidery stitching on the backs of fine gloves, and for almost the entire sewing of the cheaper and heavier gloves. The putting in of the thumb-piece requires special skill and management. Badly made gloves commonly give way at this part. The superiority of the French and the best English cloves depend which were the adaptation of their gloves depends chiefly upon the adaptation of their shape to the structure of the hand by giving additional size where the flexure of the hand requires it.

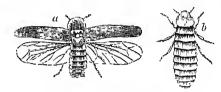
Kid gloves are of two principal kinds, Glace and Sudde, according to the manner of dressing and finishing the leather used. Glacé gloves are thoso which are dressed, dyed, and polished on the hair or outer side of the skin, while Suede gloves are carefully pared, smoothed, and dyed on the inner side of the skin for their jumpose, and thus have the comparation of the alumning.

Paris and Grenoble are the ehief seats of the French kid-glove trade. Military gloves are made at Niort and Vendôme. Brussels and Copenhagen at Nort and Vendome. Brussels and Copenhagen are also important glove-making centres. In Eugland, Worcester is the principal seat of the glove industry; and in a speciality, the so-called English dogskin gloves made from tan skins of Cape sheep, English manufacturers are without rivals. See Beck's Gloves; their Annats and Associations (1883).

Glow-worm, a name applied to numerons 'phosphorescent' beetles in the sub-family Lampyrides (fam. Telephoridæ) already distinguished from the Fire-flies (q.v.). They are noeturnal in habit, and represented by about 500 species, widely distributed, especially in warm countries. The phosphorescent structures are situated on the abdomen, and are present in the larva as well as in abdomen, and are present in the larva as well as in the adult forms. The larva are elongated, but flattened, of a velvety black colour, and feed especially on living snails. The adult females tend to retain a larval appearance and are often destito retain a larval appearance, and are often destitute of wings.

The commonest European glow-worms are Lampyris noctiluca and L. splendidula—the Johanniswürmchen of the Germaus-in both of which the females are slightly larger and wingless. The male of the former is also comparatively sluggish and keeps among the grass, while that of the latter 225

flies actively about in the evenings. The general life-history of such Lampyrides is as follows: The yellowish phosphorescent eggs are laid in early spring; the voracious larve are vigorously crawling about by April; in summer, however, they fall into a pupa shumber, and may so remain till the text spring, when adult life is attained. In Lampyris noctiluca (which is the British species) the females



Glow-worm (Lumpyris noctiluca); a, male; b, female.

give the more brilliant light, but in other cases the reverse is often true, while in one of the American species (Photinus dimissus) only the male is luminous,

Gosse has described a number of West Indian forms, such as *Photuris versicolor* and the yet more forms, such as Phothe's versicotor and the yet more gorgeous Pygolampis xanthophotis, which with green and orange lights respectively sometimes light up the foliage with bewitching brilliancy. America is very rich in 'lightning-lugs,' such as Photuris pennsylvanicus, and species of Pyractomena and Photims. Pyrocalia, Luciola, and Lamprocera are other important genera widely distributed.

The luminous organs consist, like those of the Fire-flies (q.v.), of fatty-looking cells round which there is a plentiful supply of trachese, affording the necessary oxygen for the rapid vital combustion of necessary oxygen for the rapid vital confunction of phosphorescence. In regard to their utility it has at least been settled by the experiments of Emery and others that they serve as love-signals between the sexes, while it is probable that the flashes also illumine the beetles' paths and frighten designing foes. For what is known of the real physiology of luminosity, see Phosphorescence. Professor Emery gives a most entertaining account of his observations on the love-lights of Luciola italica, observations on the love-lights of Luciola statica, which he studied in the meadows round Bologna. By catching females and imprisoning them in glass these in the meadows he satisfied himself that sight, not smell, was all important. When the females eaught sight of the flashes of an approaching male, in spite of their tantalising situation, they allowed their splendour to shine forth. In the two sexes the colour of the light is identical, the intensity also appears much the is identical; the intensity also appears much the same, though that of the female is more restricted. The most noteworthy difference is that the luminous rhythm of the male is more rapid and the flashes briefer, while that of the female is more prolonged, at longer intervals, and more tremmlons. The attracted males dance round about the female, who after having captivated one suitor, proceeds to signal other rivals, till she is finally surrounded by a circle of devotees. See articles by Professor C. Emery, Bull. Soc. Entomol. Ital., 1885-87; and C. F. Holder's Living Lights (1887).

Gloxinia, a genus of plants of the order Gesneraceae, with a nearly bell-shaped delicately-tinted corolla and richly-coloured leaves. Natives of tropical America, they have since 1820 become ornaments of European greenhouses. The species ornaments of European greenhouses. The species is named after a botanist, Gloxin of Colmar, who wrote in 1785.

Gluckov, a town in the Russian government of Tehernigoff, 112 miles E. of the town of that name, has manufactures of soap, candles, and leather,

and a considerable trade in grain. In the vicinity is the chief source for porcelain clay in the empire. Pop. (1880) 16,440.

Glucinum, or Beryllium (sym. Gl., eq. 9.4), is a metal with a specific gravity of 2.1. It is white, malleable, and fusible below the melting-point of silver. It does not burn in air, oxygen, or snlphur, but in the first two substances it becomes covered with a thin coat of oxide. It combines readily with chlorine, iodine, and silicon. Even when heated to redness, it does not decompose water. It dissolves readily in hydrochloric and sulphuric acids, and in a solution of potash, but is insoluble in ammonia, and only slightly acted on by nitric acid. Glucinum was first obtained from glucina by Wohler in 1827, who promued it by decomposing the chloride of glucinum, obtained by evaporating a solution of glucina in hydrochloric acid. Debray afterwards (1854) obtained it much more alum-Sainte-Claire Deville for the reduction of aluminin. The name glueinum or glycinum (from the Gr. glukus or glykys, 'sweet') was given to the metal on account of the taste of its salts.

Glucina, GIO, the one oxide formed by glucinum, is an earth obtained by Vanquelin in 1797 from the emerald, and which was afterwards found in the beryl and a few minerals. Glucina is a white, loosely coherent powder, without taste or smell. When heated to the strongest temperature of a wind furnace it assumes the form of microscopical prisms resembling corundum. Glucina is perfectly insoluble in water, and only dissolves in dilute acids magnifican water, and only dissaives in drute acids when it has not heen ignited strongly. It is easily soluble in boiling concentrated sulphuric acid, and if fused with an alkali, and the cold mass treated with water, the glucina goes into solution. Glucinum hydrexide, Gl(Oll)₂, is thrown down as a gelatinous precipitate when a glucinum salt is precipitate with a glucinum salt is precipitated with ammonia. Glucimum forms salts with the various acids; they are colourless, and much resemble those of aluminium. The mineral much resemble those of aluminum. The beryl, of which the emerald is a variety, is a double ellipsic of cheina and alumina. The universal silicate of glucina and alumina. The mineral cuclase is also a double silicate of the same earths; while the chrysoberyl is an aluminate of glucina, coloured with ferric oxide.

Gluck, Christoph Willibald, Ritter von, the reformer of opera, and the first great name the reformer of opera, and the first great name among modern opera writers, was born 2d July 1714, at Weideuwang, a small village of Bavaria on the Bohemian freutier. His mother, like those of Haydn, Beetheven, and Schubert, seems to have been a cook; his father had been one of those German free-lances who sold their military transfer to the belief the later that the first the fact that the first that the fi tary service to the highest bidder during the troublous times of the Marlberough campaigns, and now, tired of lighting, had taken service under various princelets in the capacity of forester. Gluck had given no indication that music was to be anything more to him than a favourite recreation, until at Prague University he found himself forced to supplement a very scanty allowance by teaching music; and at the age of twenty-two the call of art had become so imperative that he decided to try his fortune among the musicians of Vienna. There the good offices of his patron Prince Lobkovitz, and the friendship he contracted with Count Melzi, another noble amateur, were of great service to him. He was introduced to the best society and placed for four years under the famous Sammartini (or San-Martini), the predecessor of Haydu, and a composer of great energy and originality. In 1741 he received a commission for his first opera, *Artaserce* (in one act), and six others followed in the succeeding four years. The

growing fame of the young composer travelled as far as England, and in 1745 Lord Middlesex, the enthusiastic operatic entrepreneur, invited him to London, when a new opera, Lu Caduta de' Giganti, London, when a new opera, La Cadatta de Gryanti, was performed. Handel, an antocrat at that time in London, pronounced the stranger's music 'detestable,' and declared 'he knows no more about counterpoint than my cook.' Gluck's London visit must be called the turning-point in his career. His study of Handel's work revealed to him some unsuspected capabilities of music in illustrating the text; and the complete failure of Piramo cd Tisbe, a miserable pasticcio, or collection of shreds and patches from various sources, and dignified by the name of opera, turned his thoughts to the consideration of truths which, however unsuited or antagonistic to the demands of popular taste and nsual practice, lie deep down at the foundation of all dramatic art. A visit to Paris gave him an opportunity of hearing the excellent 'recitative' writing of Ramean, and thus inspired him anew for his great mission; and when in 1746 he left London for Vienna by Hamburg and Dresden, noting doubtless in these great opera schools more to avoid and more to strive after, we may say that his first period of work was completed.

The next open he contributed to the Vienna stage shows signs of the direction in which his stage shows signs of the direction in which his ideal was tending, and some of the music in Telemaco (produced in Rome, 1750) and La Clemenza de Tito (Naples, 1751) he afterwards considered good enough to be incorporated in Armide and Inhigénie; but the transition period—during which in 1755 or 1756 the pope made him a 'knight of the Colden Spur'—has not much of interest to offer. The light and frivolons Motavicaio held as it were a newcocky in Vienna Motastasio held as it were a monopoly in Vienna as librettist, and his plots were more suited to the kindred genius of Hasse than to that of the serious reformer. Gluck turned to Calzabigi, imperial conucillor and well-known literary amatenr, and in 1762, after much ruthless digging among the rubbish of Italian opera to provide a firm foundation, he succeeded triumphantly in laying the corner-stone of the modern music drama in Orfco, with the notable title, 'Pranma per Musica.' Constant collaboration with the libretist was of great assistance to both in the production of a coherent organic whole. This work was followed in 1766 by Alceste, with a simple pathetic plot, and even more severely classical than its predecessor in libretto and treatment. The letter of dedication to the Duke of Tuscany, which was printed as a pre-face, at once explains his theories and proclaims the careful and logical thought which led him to adopt them.

The standard of ideal opera was still further advanced in Paride ed Elenna (1769), the last work written for Vienna before he entered on his brilliant career in Paris. The popularity of the dauphiness, who as Marie Antoinette had been his pupil in Vienna, was of great assistance to Gluck in his attempt to establish himself on the then premier opera stago of Europe. His first work there, Iphigénic en Aulide, on Racine's play, proved an enormous success, and Orphée, an adaptation of his earlier Orfeo, stirred the utmost enthusiasm among the rapidly increasing number of his supportors. The French version of Alceste, though received coldly at first, hecame quite as popular. Gluck was at the summit of his success when the storm broke the famous (Huck and Piceini war began. An eye to business more probably than the usual charge of jealousy seems to have been the mative for inviting the well-known Italian composer Piccini to Paris and pitting him directly against Gluck. Musical Paris was immediately and sharply divided into Gluckists and Piccinists. The comparative failure of Gluck's Echo et Narrisse (September 1779), and the superior ability of the literary men in the ranks of the Piceinists, long made it impossible to say towards which side victory inclined, until the continued success of the earlier Iphigénic en Tauride (produced in May 1779) finally decided it in Gluck's favour. Piccini's opera of the same name, a much inferior work, proved a very effective weapon in the hands of the Gluckists. The conqueror retired from Paris full of honour and comparatively wealthy. Two strokes of paralysis warned him against undertaking any more active work; and a third severer shock in 1786 was the forerunner of death, which in the following year (November 15, 1787) ended an exceptionally long, vigorous, and successful career.

As Gluck's energies were, with one or two unimportant exceptions (Odes and Songs by Klopstock, a 'De profundis,' and a 'Dominus noster'), directed exclusively to the composition of operas, excerpts from which, even when complete enough in themselves for effective quotation, must necessarily labour under the disadvantage of being separated from the context, the excellence of his work is little known in England and America, and its importance is almost invariably overlooked or underestimated. His gift of melody was not so full, rich, and spontaneous as that of other composers of the first rank, but the care he exercised to leave no means unemployed by which he words makes no small amends.

Ample testimony is borne to his genins for orchestration by numerous passages in Berlioz's standard Treatice on Instrumentation, where, among sixty-four examples of remarkable effects, no less than seventeen are from the works of Cluck. These and other excellences made his work capable of performing a mission the importance of which cannot be too highly stated or too often insisted on. He found the opera an emasculated creation, paying attention only to roundness and sensious beauty of form, neglecting ethic, dramatic, and poetic principles as much as natural manliness. He left it with a lofty ideal of a time when the libretto should be as serious and noble in purpose as the music; when the musician's first and only effort should be to clothe and illustrate the words; when even the necessity of action might be subordinated to the development of character, and feelings be painted rather than deeds. He also inspired the succession of great men who followed him on the stage of Paris, and who worked along his line until Itichard Wagner, a deep student in the more spontaneous developments of Mozart, Beethoven, and Weber, applied all his genins to the improvement and extension of Gluck's ideal, and called it the Music Drama. See his Life in French by Desnoiresterres (1872); in German, by Schmid (1854), Marx (1803), and Reissmann (1882).

Glickstadt, a town in the Prussian province of Sleswick-Holstein, on the right bank of the Elbe, 32 miles by rail NW. of Hamburg. Founded in 1616 by Christian IV. of Denmark, it is a pretty town, regularly built, and intersected by canals, its chief building the Rathhans (1642; restored 1874). Its harbour remains open in winter, when the Elbe higher up is frozen, and has been much improved since 1880. During the Thirty Years' War Glickstadt successfully withstood three sieges; its fortifications were demolished in 1815. Pop. 5483.

Glucose, or Grape Sugar. See Sugar.

Glucosuria, a modern name for Diabetes Mellitus (see Diabetes), and indicative of its characteristic symptom, the presence of sugar in the urine.

Glue is merely an impure Gelatine (q.v.). Almost every animal substance will yield it, hence all kinds of animal refuse find their way to the glue-makers' boilers. The refuse of tanueries, consisting of the clippings of hides, hoofs, ear and tail pieces of ox, calf, and sheep are preferred, because they can be dressed with lime, which removes the hair, and acts as an antiseptic. For this purpose they are placed in tauks with quicklime and water for two or three weeks. They are afterwards washed and dried, and are ready for use by the glue-maker, who usually gives them another heavier lime-dressing, and subsequently washes them; they are afterwards exposed to the action of the air for a time, to neutralise the caustic lime. When well drained, the pieces are placed in flatbottomed copper-boilers, which have a perforated false bottom placed a little distance above the true one, to prevent the burning of the materials, and which have been supplied with rain or other soft water up to two-thirds the depth of the boiler, the pieces being piled up to some height above the top of the open boiler. The whole is kept at a gentle boiling heat until all the gelatinons part has dissolved out, and the mass of material has sunk down into the finid. The boiling is sustained until, by repeated trials of small quantities, the operator knows the fluid is of the right consistency, when it is dnawn off carefully into the congealing boxes.

The congealing boxes are of wood, and are nearly square, being slightly narrower at the bottom than the top; they are filled to the brim, and when their contents are sufficiently solidified the glue, with a little management, turns out in the form of a cube, which is cut into thin slices by a wire in the same manner as soap; and these larger slices are subdivided into smaller cakes by a wet knife. Frames, with nets stretched upon them, are provided for drying the cakes upon; and these frames, when covered with the cakes of glue, are adjusted one over another at a little distance apart, supported between four uprights, and, if in the open air, covered over with little wooden roofs, the whole being arranged so that the air can have free access to facilitate drying. This process is an anxions one for the manufacturer, as the changes of the weather have great and often completely destructive effects upon glue in this state. In Britain spring and autuum are the best drying seasons. Generally, after the open air drying, the glue is taken to drying-rooms, heated slightly, where it hardens effectually; but it is not yet finished; the cakes at this stage have a dull, unsightly look, to remedy which they are dipped into cold water, or are wetted with a brush dipped in hot water, and redried, this wetting giving the cakes a bright varnished appearance.

While England does not excel in this manufac-

While England does not excel in this manufacture, it is a recognised fact that Scottish glue—such as that made by Messis Cox at Edinburgh—ranks in the front of the glues of all countries. A light-coloured glue is not necessarily good, nor dark-colonred glue necessarily bad. A bright clear claret colour is the natural colonr of hide-glue, which is the best and most economical. Light-coloured glues (as distinguished from gelatine) are made either from bones or sheepskins. The glue yielded by these materials cannot compare with the strength of that yielded by hides. A great quantity is now made in France and Germany from bones. It is got as a by-product in the manufacture of animal charcoal. Although beautiful to look at, it is found when used to be far inferior to Scottish hide-glue. The latter is largely used by matchmakers, piano-makers, and cabinet-makers, who export their goods to all parts of the world, and to whom, owing to the damp climates of many parts

to which they export, a first-class glue is absolutely necessary. Besides its use in joinery, cabinet-making, book-binding, match-making, and similar operations, glue is used by paper-makers and in dressing silks; and for those last two purposes fine light-coloured kinds in thin cakes are made. Large quantities are employed by paper-hangers and others for sixing walls. It is also used for stiffening straw, cotton, horsehair, and other plaits for making bonnets and hats. See Dawidowsky, Glue, Gelatine, &c. (Eng. trans. 1884).

Marine Glue is not a glue, but a cementing composition used in shiphuilding, for paying seams in ships' deeks after being canlked. In hot climates

Murace Glue is not a glue, but a cementing composition used in shiphuilding, for paying seams in ships' deeks after being canlked. In hot climates it is preferred to tar for this and other purposes, where the materials are exposed to the influence of wet. It consists of india-rubber entirely small, and digested at a gentle heat in a closed vessel with contar naplitha until it is dissolved, when pawdered shell-lac is added, and the digestion continued until

it also is dissolved.

Glukhov. See GLUCHOV.

Glume, a term applied to cortain linacts in grasses and sedges (which are sometimes conjoined as (dumifenc). See Grasses, Cyperacelle.

Gluten is one of the most important constituents of the varieties of coun used as food. It is obtained by mixing flour with water, and thus forming a paste or dough. This paste is placed in a bag of line linen, and kneaded in water, which must be repeatedly changed till it ceases to assume a milky appearance. A gray, tenacions, viscons, tasteless substance, having the appearance of birdline, is left in the bag. This substance consists mainly of gluten, mixed with traces of hran starch and of oily matter. The gluten thus obtained from wheat and from tye is far more tenacions than that which is obtained from the other cereals, and it is the great tenacity of this constituent that especially fits these floms for conversion into bread. It is found by analysis that the proportion of gluten (16 per cent.) contained in wheat grown in Algeria and other hot countries is considerably higher than in wheat grown in England (10.7 per cent.), or still colder countries; the proportion in the wheat of the United States seems to vary from 9.85 to as much as 15.25 per cent.; and the land, thin-skinned wheats contain more of this ingredient than the softer varieties of the grain.

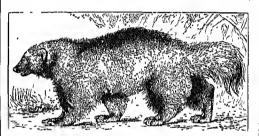
Gluten in a moist state rapidly putrefies, the mass acquiring the smell of decaying choese; but when dry it forms a hard, brownish, horny-loaking mass, that does not very readily decompase. On treating gluten with hot alcohol, we find that it resolves itself into at least two distinct substances, one of which is soluble, and the other insoluble in that thad. The insoluble portion—vegetable fibrin—is a gray, tough, elastic substance, insoluble in water or in ether, but readily soluble in dilute alkalies, from which it is precipitated by neutralisation with acetic acid. The saluble portion is in part precipitated from the alcohol on coaling, in the form of flakes, which have the composition and properties of casein—a vegetable casein; while a third substance, gluedin, remains in solution, giving to the alcohol a syrupy consistence, but separating on the addition of water, as a white substance resembling albumen. All these constituents of gluten contain carbon, hydrogen, nitrogen, oxygen, and sulphur, in much the same proportion as the animal albuminates or protein hodies, and they all doubtless belong to the flesh-forming group of

foods.

The action of glutcu in the manufacture of bread is probably a double one; it induces, by constant action, an alteration of the starch, and subsequent

fermentation, while by its tenacity it prevents the escape of carbonic acid gas. See BREAD.

Glutton (Unlo), a carnivorous quaduped belonging to the weasel family (Mustelide). There are three false molars in the upper, and four in the lower jaw, anterior to the catnassial tooth, which is large and sharp. The body is long—about 2 feet 6 inches—the legs are short, the feet have each five deeply-divided toes, terminated by long enryed claws. The tail is rather short—about 7 or 8 inches; a fold beneath the tail supplies the place of the glandular pouch of the badgers; but when hard pressed by encuies the gluttons emit a peculiar fluid of a strong musky odour. Their habits are noctarnal. Both body and tail are covered with long hair, under which the body is covered with a rich thick fur. The general colour of the long hair is brown, sometimes approaching to black, lighter bands passing from the neck along the flanks, and meeting at the tail. The short fur is chestant brown. The muzzle is black. A lightbrown band runs across the forehead from ear to ear. The fur of the glutton is sometimes of considerable value, and is used for untils, cleaks, &c.,



The Glutton (Ciulo Inscus).

but varies not a little in glossiness and other qualities (see Funs, Wolverine). There is only one species, commonly called Glutton, and also Wolverine (G. Insens), a native of the northern parts of Emope, Asia, and America. It is more common in the arctic regions than towards the southern limits of its distribution, which are about the forests of Courland, in Europe, and northern California, in America. The most extraordinary stories were at America. The most extraordinary stories were at one time eledited concerning the ferocity, voracity, and cuming of this animal, and have not altogether disappeared from books of natural history. It is very expable of domestication, and even in a wild state exhibits no remarkable feroeity; nor in the state exhibits no remarkable feroeity; nor in the state exhibits no remarkable feroeity; nor in the state of the state o there any reason to believe that it leaps from trees on deer, or pursues any of those artful methods of procuring food which were once ascribed to it. It often preys on animals which it has not itself killed. The smaller quadrupeds are its principal food, and it devours young foxes in great numbers. Its speed is not great, but it excels in strength and perseverance. The traps set for the smaller kinds of animals—e.g. martens in the far countries of North America are very often robbed by the wolverine, and it has been known to remove a great pile of wood in order to get at provisions which had been hidden under it.—('losely allied to the glutton are the grison, the badger, the otter, and the ratel. Bone-caves and some of the newest deposits exhibit remains of more than one species of glutton.

Glycerine, GLYCEROL, or PROPENYL ALCOHOL, $C_nH_5(\mathrm{OH})$, was discovered by Scheele in 1779, who obtained it in the preparation of lead-plaster, and named it 'the sweet principle of fats.' It is a colourless, viscid, neutral, inodorous fluid, of an intensely sweet taste, is soluble in water and alcohol in all proportions, but is insoluble in ether

and in chloroform. Its specific gravity is 1.27. If quickly cooled down, glycerine does not crystallise, but solidifies at 40° C. into a gum-like mass. In the winter of 1867 it was discovered that some glycerine which was being shipped to England had flozen into a solid crystalline mass; till then glycerine was believed to be uncrystallisable. At 100° it is slightly volatile, but if distilled alone the greater part of it becomes decomposed; it may, however, be distilled without alteration in a curient of superheated steam. By this means Wilson succeeded in 1854 in separating heated fats into glycerine and the acid with which it was previously in combination; the glycerine is thus obtained in a high state of concentration as a global or support of the state of concentration as a colonriess, syrupy liquid, which can be thus prepared in unlimited quantity.

(Alycerine occurs ready formed in a few fats (as, e.g., old palm-oil), and, according to Pastem, is contained in all fermented liquors, and especially in winc. It is a product of the saponification of the various fats. See SOAP.

Glycerine is a triatomic alcohol—i.e. it is derived from three molecules of water by replacing three atoms of hydrogen by the triatomic radical C_3H_5 ; or it may be considered a compound of C_3H_5 with three molecules of hydroxyl, OH—and may be represented by the formula $(C_3H_5(OH)_3)$; and in the animal and many vegetable fats, the three molecules of hydroxyl are replaced by three molecules of the univelence fatty axid. In the savenity notecules of hydroxyl are replaced by three molecules of the anhydrous fatty acid. In the sepantication of these fats—that is to say, when they are treated with potash, soda, or oxide of lead, or under the influence of superheated steam—the fatty acid separates from C₃H₅, which assimilates three molecules of hydroxyl and becomes glycerine. Chycerine forms soluble compounds with baryta, strontia, and lime; and it dissolves oxide of lead and numerous solute. It is found that algorithms and numerous salts. It is found that glycerine is convortible into a true fermentable sugar when treated with a mixture of potassium bichromate and sulphuric acid, or with potassium permanganate

in presence of sunlight.

We have already referred to the best mode (Wilson's process) of obtaining glycerine on a large scale; the usual method of obtaining it on a small scale is from olive-qil, which is sapunified by treating it with an equal weight of litharge (lead oxide). This is mixed with water, and added to the oil, with which it is boiled till the saponification is complete. The glycenine is dissolved by the water, and is easily separated from the insoluble lead-plaster (a mixture of oleate and palmitato of lead). Any traces of lead are removed by sulphuretted hydrogen, and the water is expelled in racuo, as the glycerine would turn brown in the open air.

The uses of glycerine are numerous. cine it is employed as a local application in diseases of the skin and of the ear; it is used as a solvent for many drugs; and is taken internally for the same purposes as cod-liver oil. It is a valuable preservative fluid for small and delicate anatomical preparations, and it has been applied to the preservation of meat. It is used in perto the preservation of meat. It is used in perfumery, in calico-printing, and in the preparation of leather. It is used by the wine-dealer to 'improve' the quality of wine, and by the brewer, as it is said, to impart keeping power to beer. Very large quantities of glycerine are required for the production of Nitro-glycerine (q.v.) and other explosives. It has been added to the water in gasnetors with the view of preventing it from freezing meters with the view of preventing it from freezing. It is used in the manufacture of copying-ink, and is of general application where a lubricating agent is required.

Like the alcohols in general, to which class glycerine belongs, it forms several classes or series

of derivatives, the most important of which are its combinations with acids, which are analogous in their composition to the various fats and oils. See Roscoe and Schorlemmer's Treatise on Chemistry, and Schorlemmer's Manual of the Chemistry of the Curbon Compounds.

Glycocoll, or Amido-Acetic Acid, CH. (NH.) CO.H., was first prepared by Biaconnot in 1820, heing obtained among the products of the action of sulpluric acid on glue, and received from him the name sucre de gelatine, on account of its sweet taste. It is a product of various processes of decomposition of animal matters. Glycocoll is very soluble in water, the solution having no effect on vegetable colonis, but it is insoluble in alcohol. Glycocoll combines both with acids and bases, and the compounds in both cases are soluble and erystallisable,

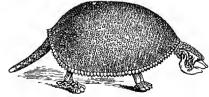
Glycogen, $C_{12}H_{23}O_{10}, H_{2}()$, sometimes called animal starel, was discovered by Claude Bernard in the human liver as well as that of graminivorous It has been shown to exist very widely diffused throughout the animal kingdom, and appears to be an essential accompaniment of celhilar growth, occurring in large quantities in the fortus. It occurs also in blood and muscular tissue. In the structure also in mode and intechar its defined in mollusca, dried systems being said to contain as much as 9.5 per cent. Glycogen has also been detected in the vegetable kingdom, in moulds and other fungi. Its uses in the animal economy are noticed in the article LIVER.

Glycol is the type of a class of artificial compounds, whose existence was inferred, and afterwards discovered, by Wurtz. In their chemical relation and properties they form an intermediate common alcoholis the type, on the one hand, and the triatomic alcohols, a class of bodies of which ordinary glycerine is the type, on the other. The name of glycal, formed from the first syllable of glycerine of glycal, formed from the first syllable of glycerine and the last of alcohol, has been given to express this relation. The glycols are accordingly teimed diatomic alcohols. Ordinary glycol is formed from ethylen, C₂H₄, and hence may be called ethylglycol, to distinguish it from propylenglycol, which is formed from propylen, C₃H₆, from butyl-glycol, which is formed from butylen, C₄H₈, or from anylglycol, which is formed from anylen, C₅H₁₀. Glycol is a colourless, slightly viscid finid, with a sweet laster and its composition is expressed by the taste, and its composition is expressed by the forumla $C_2H_4(OH)_2$. See Schorlemmer's Manual of the Chemistry of the Carbon Compounds.

Glycose. See Sugar.

Glycosmis, a genus of Aurantiacere, trees of the East Indies. The fruit of G. citrifolm is delicions.

Glyptodon (Gr., 'engraved tooth'), a gigantic fossil animal belonging, like the Megatherium (q.v.) and the Mylodon (q.v.), to the Edentata, but of the family of the Dasypodidae or Armadillos.



Glyptodon clavipes.

It is found in the post-tertiary deposits of the pampas of South America, and four species have been described. The back and sides of the creature were covered with a carapace of thick, nearly hexagonal, bony scutes, which in some eases was nearly 6 feet long. The head was similarly protected by a helmet of bony plates, while its tail was completely sheathed in a casing of the same kind. The glyptodon must, from the shape of the earapace, have looked liker a huge tortoise than an armadillo. Unlike the latter, it had no movable hands in its armour, and therefore could not roll itself np when attacked by its enemies. Its teeth, eight in each jaw, had each two lateral senlptured grooves, whence the name.

Gmelin, Leopold, a German ebemist, was born at Gottingen, 2d Angust 1788, and died at Heidelberg, 13th April 1853. Having studied medicine and chemistry at Göttingen, Tübingen, and Vienna, be began to teach chemistry at Heidelberg in 1813. Four years later he was made professor of Medicine and Chemistry, and held that chair until 1850. His great work is an excellent dictionary of chemistry, entitled Handbuch der Chemie (1817-19). Besides this he wrote, along with Tiedemann, a book on digestion (1826-27), and another on the method by which the food-products pass into the blood (1820). The Handbuch was translated into English and enlarged by Watts (1848-59).—His grand-nucle, Johann Georg Gmelin, born at Tubingen, 10th August 1709, professor of Chemistry and Natural History at St Petershurg from 1731, and Botany and Chemistry at Tibingen from 1749, died there 20th May 1755. He spent ten years (1733-43) of his life travelling in Siberia, making observations on the botany, and wrote Flora Sibirica (1748-49) and Roisen durch Sibirica (4 vols. 1751-52).—His nephew, Samuel Gottling (1747-74), became professor of Botany at St Petersburg (1767), studied the botany of the southern portions of Russia, and wrote Historia Fucorum (1768).—Another nephew, Johann Friedman (1768).—Another nephew, Johann Friedman (1768).—171-77).

Guelina, a genus of verbenaceous trees. The timber of & arborea (Koombar or Goombar of India) resembles teak, but is closer in grain, and lighter.

Guind, a town of Würtemberg, stands in the channing and fertile valley of the Roms, 30 miles E. of Stuttgart by rail. It has some fine old churches, and carries on important manufactures of jewels and hardware; hops and fruit are much grown in the neighbourhood. (5nind in the middle ages was an imperial free city of Swabia, with 18,000 inhabitants. It was added to Würtemberg in 1803. Pop. (1875) 12,838; (1885) 15,321. See works by Grimm (1869) and Kaisser (1882).

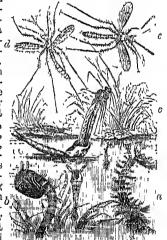
Gnunden, a town of Upper Anstria, 159 miles W. of Vienna by rail. It lies 1439 feet above sea-level, amid the grandest seenery of the Salzkammergut, at the lower end of the Trannsee or Lake Gnunden (8 by 2 miles), above which towers the Traunstein (5536 feet). With numerous hotels and villas, it is a favourite summer bathing-place. Salt-mines employ many of the inhabitants. Pop. 6631. See Feurstein, Der Kurort Gnunden (6th ed. Vienna, 1885).

Gnaphalium. See Cunweed, Edelweiss.

Guat (Culce), a genus of dipterous insects represented by nuncrous widely distributed species, and specially abundant in marshy districts. There are nine British species, of which the Common Guat (Culce pipiens) may be taken as typical. The colour of the middle portion of the body on the upper surface is yellowish-brown, marked with darker longitudinal lines; the posterior part is light gray. The abdomen is long, slender, and slightly flattened; the legs, very long and thin;

and the delicate glassy wings bear numerous hairs on the veins and along their posterior margins. When the insect is at rest the wings are laid flat back upon the body. The antenna consist of four-teen joints, and bear circlets of hair, which, in the male, may be so long and thick as to give a feathery appearance. The female is furnished with mandibles which are absent in the male. The male gnat sips nectar from the flowers and passes his days in joyons dancing in the smalight; the female spends, not her days only, but her nights, in pursuit of men and eattle into whom she may drive her sharp lancets, to suck from their blood her more nutritions, if less delicate diet. The proboscis, whose double function of piercing and sucking was noticed even by Pliny, is an extremely complex structure composed of representatives of the three usual mouth appendages. The lumining sound produced by the female in flying, the deeper notes of which are due to the rapid vibration of the wings (computed at 3000 per minute), the bigher to membranes on the thoracic openings of the air-tubes, serves in part, doubtless, to attract the males. Darwin quotes Mayer to the following effect: 'The hairs on the autenox of the male gnat vibrate in unison with the notes of a tuning-fork, within the range of the sounds emitted by the female. The longer bairs vibrate sympathetically with the graver notes, and the shorter hairs with the higher ones.' Landois also says that he has repeatedly brought down a whole swarm of gnats by uttering a particular note. After fertilisation, the female lays her eggs—300 at a time, it may be—in a pool

or ditch of stag-nant water, proor-ing them by a glutinous sub-d ing leaf or twig. The larvæ, which in favonrable cireumstanecs are hatched in a few days, are about half an inch long, of a black colour, intensely active, with bristle-fringed mandibles which vibrate continually, making a little eddy which b conveys food-particles to their months. When at rest, they suspend themselves head downwards frou the surface of the water, and take in air through a curi-



Life-listory of the Ghat (Culca pipiens):

u, larva; b, papa; c, perfect insect energing; d, male, and e, female gunt.

ous tube projecting from the eighth segment of the abdomen. They remain in the larval state about three weeks, during which period they moult three times. The pupa is smaller and lighter in colour; it also is active, though, of course, it takes no nonvishment. Its external air-tubes are situated on the sides of the thorax, and project beyond its head. When mature, the pupa comes to the surface, the skin splits longitudinally, and the perfect gnat slowly emerges. Many, however, never taste the delight of flying, for their weak wings being drenebed cannot be spread, and the insects are drowned without fully escaping from their pupa-skin. Several generations of gnats follow one another in a season. In the Fen district they are sometimes so abundant that the inhabitants are forced to use curtains

and such means of protection against them as are used in hotter countries against their allies the Mosquitoes (q.v.). Guats occasionally swarm together in such numbers that they present the appearance of dense clouds of smoke; and it is recorded that, in the year 1736, an alarm of fire was raised in Salisbury because of the vast columns of gnats swarming round the cathedral spire,

Gneischau. August Wilhelm Anton, Graf Neithardt von, one of the Prissian generals of the war of liberation, was born at Schildan, in Prissian Saxony, 27th October 1760. In 1782 he accompanied the German auxiliaries of England to America. On his return he joined (1786) the Prissian army, and twenty years later fought at Saaffeld and in the hattle of Jena. He gave convincing proof of his military genins in the defence of Colberg from April to July 1807; and this led to his appointment on the commission for the rearganisation of the Prissian army, in which capacity he leut cordial support to the plans of Stein and Schamhorst. In the war of liberation he rendered distinguished service at the battle of Leipzig (1813). But his most meritorions work was his share in the Waterloo campaign, in which he was chief of Blucher's staff, and principally directed the strategy of the Prissian army. He had been tifteen years on the retired list when, in 1831, on the autbreak of the Polish rebellion, he was made field-marshal and given command of the Prissian army on the Polish frontier, but he died at Posen on 24th Angust that same year. See his Life by Pertz (5 vols. 1864-80) and Delbrück (2 vols. 1882).

Gneiss, a term introduced from the German for a foliated crystalline-gramular compound of quartz, felspar, and nica. The quartz is white or gray, and ocenrs in lenticular layers that vary from a mere line up to bands one foot or more in thickness. The felspar likewise forms folia, and is usually orthoclase, but plagicalse is often associated with it. Frequently the quartz and felspar are intimately commingled. The mica (usually Muscovite) occurs in laminar between the other minerals. In some varieties of gneiss the felspar occurs in lentilshaped swellings, farming augen-gneiss ('eye-gneiss') or porphyritie gneiss. Varieties in composition are horablendic gneiss, in which horablende replaces mica; protogine gneiss, with graphite in place of mica; graphite gneiss, with graphite in place of mica; graphite gneiss, with graphite in place of mica; graphite gneiss helongs to the great cluss of schistose rocks, and in many cases can be shown to be the product of the metamorphism of clastic racks, such as greywacke. In other cases it has been proved that gneiss has resulted from the metamorphism of granite—the one rock passing gradually into the other. The coarser-grained gneisses belong chiefly to the Archivan System (q.v.), and concerning the origin of these geologists are still divided in opinion. The finer-grained varieties are met with in many regions which have been affected by local and regional metamorphism. See METAMORPHISM.

Gneist, Heinrich Rudolf Hermann Friedrich, jurist, was born in Berlin, 13th Angust 1816. He entered official life as assessor in the Superior Court (Kammergoricht) in 1841, and was successively assistant-judge of the same court and of the Supreme Tribunal, until in 1850 he resigned this position in order to devote himself exclusively to teaching; for since 1844 he had held the chair of Jurisprudence in Berlin University. From 1858 he sat in the Prussian lower house as a National Liberal, and was also elected a member of the imperial parliament. His writings deal chiefly with constitutional law in England and Germany, and with politico-historical subjects, as Die Biddung der Geschwornengerichte in Deutschland (1849); Adel und Ritterschaft in England (1853); Das

heutige englische Verfassungs- und Verwaltungsrecht (1857-63; 3d ed. 1876-84), his masterpiece; Budget und Gesetz nach dem constitutionellen Staatsrecht Englands (1867); Die Staatsrewaltung der City von London (1867); Verwaltung, Justiz, Reehtsweg ... nach englischen und deutschen Verhaltnissen (1869); Englische Verfassungsgeschichte (1882; Eng. trans. by Ashworth, 1886); Das englische Parlament (1886; Eng. trans. by Shee, 1886), and numerons works dealing with current questions of practical polities in Germany.

Guesen (Polish Gniezno), a Prussian town, situated in a region of hills and lakes, 31 miles ENE. of Posen by rail. It has a Catholic cathedral, dating from 965, and till 1320 was the coronation-place of the Polish kings. It came finally to Prussia in 1814. Pop. (1875) 11,203; (1885) 15,760

Gnetaceae. See Sea Grape.

Gnidos. See CNIDOS.

Gnome (Gr. gnome), a pithy and sententious saying, commonly in verse, embodying some moral sentiment or precept. The gnome belongs to the same generic class with the proverb; but it differs from a proverb in wanting that common and popular acceptance which stamps the proverb, as it were, with public authority. The use of gnomes prevailed among all the early nations, especially the Orientals; and the literatures, both sacred and profune, of most countries abound with them. In the Bible the book of Proverbs, part of Ecclesiasticus, and other books of the Old Testament contain many examples; and in the New Testament the familiar lossons of our Lord are frequently presented in this striking form. The Indian, the Arabian, and the Persian literatures also are rich in gnomes, as are those of the northern nations. But the most interesting form which they have taken is that in which we find them in Greek literature, in which the writers who have cultivated this form of composition are known as a distinct class—the Gnomic Poets (gnomikoi). The Greek gnome is commonly conched in the elegiac distich; and the most celebrated gnomic poet was Theognis of Megara, in the 6th century B.C. The remains of gnomic writers have been repeatedly edited under the title of Gnomici Poets Greet, from the days of Melanchthon downwards. Standard colitions are those of Brunck (1784; new ed. 1817) and Gaisford (1820; new ed. 1823). See Proveres.

Gnome. See DEMONOLOGY.

Gnomon. When a rectangle is divided into four parts by cross lines parallel to its sides, the sum of any three of the parts is called the gnomon. For Gnomonic Projection, see PROJECTION.—Gnomon has also a meaning in dialling (see DLAL); and a gnomon, or style erected at right angles to the horizon, sometimes of great height, was much used by ancient astronomers for finding the altitudes and declinations of sun and stars.

Gnosticism. In the New Testament the charisma of gnosis, or the 'knowledge' of the mysteries of God, is distinguished from sophia, or practical religious 'wisdom' (cf. 1 Cor. xii. 8). This Christian gnosis was at first the natural product of theological reflection on the positive doctrines contained in the Gospel. A Jewish theology, based on the religious ideas of the Old Testament, was already in existence, and had received a powerful impulse from the combination of Greek philosophy with Hellenistic Judaism by Philo. The chief function of the carlier gnosis had been to discover the ideal value of the various religious histories, myths, mysteries, and ordinances, and to get behind the letter of the written word. In course

of time not only the Old Testament, but even the gospel history, was thrown into the melting-pot, and alloyed with the philosophic doctrines of Jewish Hellenism, to produce a religious theory of the universe. There was a general tendency to trace the same religious idea through different mythologies (which were held to be the popular expression of religious ideas originally revealed), and the new religion which aimed at the redemption of the whole world was eagerly seized on as the embodiment of their unifying principle. Christianity was believed to be the full revelation of the deeper truth embedded in all the nature-religious. By adapting their presentation of Christianity to the form of the ancient mysteries the Gnostic teachers the more easily fastened themselves muon the Christian congregations, and succeeded in taking up a position within them as specially initiated persons, for which they found a natural support in the prevalent ascetic views and the powerful influence of free prophecy. In Syria and the East they imparted a distinctly Guestie tinge to Christian teaching generally; in the Greek and Roman would they formed esoteric schools, which endangered the organisation of the Christian congregations ('they undermine ours, in order to build up their own —Tertullian, De Praser, Haret. 42). But these were in time forced to separate themselves, and form seets, whose great diversity becoming the more apparent greatly counteracted the influence of the Gnostic leaven in the Christian communities. To maintain their theories in the face of the traditional doctrine of the churches they had recourse to the sources of that doctrine. They claimed to have special traditions from certain skill to the allegarical interpretation of their exegetical skill to the allegarical interpretation of the written monuments of the apostolic age. The Gnostics, indeed, were the first New Testament exegetes, and the first who set the apostolic writings skile by side with the gamed historical age. with the gospel histories as authoritative Scriptures. Both in their interpretation and in their presentation of the texts they allowed themselves a free hand, omitting, adding, and sometimes forging, to suit their theories. Marcion (about 150), believing himself to be a consistent follower of Paul, rejected the authority of the carliest apostles, as well as the gospels emanating from the circles of their influence, and professed to hold the gospel known to Paul only. His collection of ten epistles of Paul was the first attempt to fix the eanon of the apostolic Scriptures. Such arbitrary treatment of the Scriptures led the elurch to resort to a more thorough study of the historical tradition. In the struggle with Gnosticism it obtained a firm hold of the principle that that alone is to be held true Christianity which can be shown to be historically derived from Christ and his apostles, and it found the only means to check the license of Gnostic speculation in the development of a Christian theology in accordance with the positive character of historical Christianity.

The general principles of Gnostic thought may be here summarised, as fuller accounts of the principal schools are given under their own names or under those of their founders. For the practical doctrine of the redemption of men's souls from sin by Jesus Christ tho Gnostics substituted a speculative doctrine of the redemption of the human spirit from matter by religious knowledge. The realistic eschatology of the primitive church thoy entirely set aside. The evangelic element in their teaching was obscured by a cloud of heathen mythologies and philosophic subtleties. The Divine Deminings and Lawgiver of the Old Testament was distinguished from the Supreme Being, and the Hebrew idea of creation was superseded by that of a continuous process of emanations from

the divine first cause. The present world was believed to be the result of a catastrophe in which the spirit fell under the power of matter, or of an original destiny that powers hostile to God should bring into existence a world in which the spirit born of God should be held in unwilling estrangement from him. All the Gnostic systems are more or less dualistic. In these dualistic theories a philosophical foundation was seemed for the practical asceticism of primitive Christianity, which was by the Guostics developed to an extreme. The highest duty of man was to become united to the First Some of Spirit through gnosis and the abso-Others, like Carpocrates and his son Epiphanes, expressed their contempt for the flesh and the ordinances of the Deminrgos in unbridled license.
The contrasts of the flesh and the spirit and of the world and the kingdom of God are interpreted as the physical conflict of vast cusmic forces, and are thereby stripped of their moral and religious significance. The intervention of Christ is the crisis, not only of the religious history of mankind, but of the whole development of the universe. As the final and perfect from he is distinguished from his visible manifestation. This is held to be either (1) a real human life with which he was connected for a time, or (2) a heavenly or 'psychical' creation, or (3) a mere phantasm. Men are divided into two clusses: the *Pnaumatic* or 'spiritual,' who are constitutionally receptive of Christ's revelation and life everlasting, and the *Hylic* or 'material,' who are doomed to perish. Valentinians and others add a third, or intermediate class, the Psychical, or men of 'soul,' who are not canable of apprehending a divine revelation, but only of the popular faith (pistis), yet thereby may attain to a

degree of knowledge and salvation.
Various classifications of the Guostic schools
have been attempted. Matter arranged them have been attempted. Matter arranged them according to their historical and national origin, Banr classified the different systems according to the degree in which they realised the idea of Christianity as opposed to Judaism and Paganism, and thus distinguished three principal schools: (1) and thus distinguished three principal schools: (1) that of Basilides, Valentinus, and others, who held the old faiths to be relatively valid developments of the religious conscionsness: (2) that represented in the Clementines, where Judaism alone is recognised; and (3) that of the Ophites and the nobler teaching of Marcion, who found the perfect expression of truth in Jesus Christ. Neander's principle of division is the position which the different systems take up towards the God of the Old Testament: whether he is regarded as a sub-Old Testament: whether he is regarded as a sab-ordinate deity, subservient to the supreme, or as eternally opposed to him, and therefore absolutely evil. Harnack distinguishes between Jewish-Christian and Gentile-Christian Gnostics, group-ing the latter according to the greater or less divergence from the common Christianity which expresses itself in their various views of the Old Testament and the Deminrgos. The church Testament and the Deminrgos. fathers attributed the origin of Gnosticism to the demons, or (later) to ambition and insubordination to the episcopate. Hegesippus traced it to the Jewish sects; Iremeus and others to the influence of the Greek philosophers. They all believed that the first founder of the heresy was Simon Magns, who, with his confederate Helena, was held by the Samaritans to be an incarnation of the divine principle (Helena being his female counterpart, like the moon-goddess corresponding to the sun-god in Svro-Phenician mythology). It is sun-god in Syro-Phenician mythology). It is clear that about the beginning of the 2d century there were munerous teachers in Syria who endeavoured, not by the accepted allegorical interpretation, but by means of a negative criticism, to

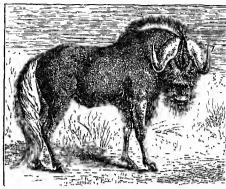
adapt the Old Testament to their idea of a universal action of the State of the Heat of a linversal religion. Cerinthus held that Christianity was identical with pure Mosaism, laying great stress on part of the ceremonial law, and holding the creator of the world to be subordinate to the Supreme Being; others traced the ceremonial laws of the Old Testament to the devil, and held the Gol of the Jews to be the highest God. Others, again, entirely discarded Judaism, and connected their Christianity with allegorical interpretations of Syrian and Babylonian mythology. The chief representatives of Syrian Gnosticism were Satur-ninus (or Satornil) of Antioeh, and the various sects of the Ophites (including the Nausenes, Peratai, and others). It is uncertain in what relation these isolated Syrian sects may have stood to the great Gnostie schools of Egypt and the West, the Basilidians and Valentinians. After the confederation of the Christian communities into the Catholic Church even these great schools were not long able to maintain a separate existence, and by the end of the first decade of the 3d century their ecclesiastical influence had well-nigh disappeared. But, though the organic energy of Gnosticism was thus quickly exhausted, Gnostic ideas held their ground to a much later date, and may be traced in the writings of some of the most highly reputed Christian fathers. The Pistis Sophia, edited by Schwartze and Petermann (Berlin, 1853), is the only (inastic work that has come down to us in a complete form, except those apocryphal Gospels and Acts of the apostles which show a Gnostic tendency. Tatian's Dudessaran was used in the Syrian Church down to the 5th century. The Guastic Bardesanes of Edessa, one of the last of the Syrian Gnostics, was the founder of Syrian hymnology.

hymnology.

See Neander, Genetische Entwickelung der vornehmsten Gaostischen Systeme (1818); Matter, Histoire critique du Gnostieisme (2 vols. 1828; 2d ed. 1843); J. A. Möhler, Versuche über den Gnost. (1831; also forming vol. i. of his Gesamm. Schrift, ed. hy Dollinger); Baur, Die christliche Gnosis (1835); Möller, Geschichte der Kosmologie in der Griechtschen Kirche bis auf Origenes (1860); Lipsins, Der Gnostieismus (1860); King, The Gnosties and their Remains (1873); Mausel, The Gnostie Heresies (ed. by Lightfoot, 1875); Joel, Blicke in die Religionsgeschichte zu Anfung des 2 Christlichen Jahrhunderts (2 parts, 1880-83); Koffmanne, Die Gnosts nach ürer Tendenz und Organisation (1882); Hilgenfeld, Die Ketzergeschichte des Urchristenthums (1884), with the Gnostie fragments, and lists of books relating to the various Gnostie teachers; Renan, Orgines du Christianisme (vols. v. to vii.); Harnack, Zur Quellenkritik der Gesch. des Gnost. (1873) and Dogmengeschichte (vol. i., 24 ed. 1888); and for a concise account of the different systems, Möller, Kirchengeschichte (vol. i. 1889).

Gnn (Catoblepus), a genus of antelopes (termed Wildebest by the Boers), of which the best-known species has been often described as apparently made up of parts of different animals, not only of the antelope and the ox or buffalo, but even of the horse. This species (C. Gnu) is a native of South Africa; it has disappeared from the more settled parts of Cape Colony, but is to be seen in herds on the arid plains beyond these boundaries in company with the zebra or the quagga, and with flocks of ostriches. The form and action of gms so much resemble those of zebras and quaggas that at a distance they may be readily mistaken for them. The size of the gnn is that of a large ass; the general colonr is yellowish-tawny. Both sexes have horns. The limbs are slender, like those of deer and antelopes. The gnn gallops with great speed. It has been usually represented as a very fierce animal, and certainly shows much ability to defend itself with its horns, when unable to escape from danger by flight; but when taken young it is easily tamed, and readily associates with oxen,

accompanying them to and from the field. There are two or three species, all South African, nearly



Gnu (Catoblepas Gnu).

resembling the common gau, and one considerably larger. Their flesh is said to be palatable.

Goa, a Partiguese possession on the west coast of India, stretching from 14° 53′ to 15° 48′ N. lat., and from 73° 45′ to 74° 24′ E. long., with an area of 1262 sq. m., and a pop. (1881) of 445,449. A hilly country, hounded on the east by the Western Ghats, the territory is intersected by numerons rivers, mostly navigable, which render the soil in their neighbourhood sufficiently fertile. Half of their neighborhood same sent, recent the land under cultivation, which embraces a third of the entire area, is devoted to rice; stately forests cover nearly a fourth of the remainder. The terricover nearly a fourth of the remainder. The territory is divided for administrative purposes into two sections known as the Velhas and Novas Conquistas (Old and New Conquests), which are subdivided into nine 'provinces.' The chief civil and military authority is vested in a governor general of Portngnese India, appointed by the king; he is aided by a general council, and by three subordinate juntas or councils. An archlishop, with the title of primate of the East, is at the head of the Raman Catholic Church; the native Christians constitute ware they half of the total negative, and the more than half of the total population, and the church's festivals are celebrated in Goa with great pamp. In 1871, in consequence of a rebellion, the native army was disbanded, and the colony is now held by a European force of little over 300 men; the police force is nearly 1000 strong. The revenue slightly exceeds the expenditure: the investigation of the colony of the col imports have long exceeded the exports. Captured by Albuquerque in 1510, Golden Goa' reached by the end of the century a pitch of military and ecclesiastical splendom and commercial prosperity such as finds a parallel in India only in the most brilliant days of the Mogul capitals. The decline of the Portuguese power quickly followed the appearance of the Dutch (see EAST INDIA COMPANY), and in 1759 the city of Old Goa, ence the chief emporium of trade between the east and west, was deserted by all but its ecclesiastical inhabitants, and left to the decay in which it has since lain. Its one-time population of 200,000 has sunk to less than 1900; its arsenal, its palaces, its quays, even many of its churches are in ruins, their sites covered with cocoa-unt plantations, and the streets overrun with grass. Among the edifices that survive are the majestic cathedral, where services are held regularly every day, and the splendid church of Bom Jesus, containing the magnificent tomb which enshrined the remains of St Francis Xavier. The new capital is Nova Goa or Panjim, on the Mandavi, 3 miles from its mouth. It presents a picture among a presence its streats are wide and clean. esque appearance; its streets are wide and clean;

and new barbonr and railway works were inaugnrated on 31st October 1882. The public buildings include the viceregal palace and spacions harracks, one wing of which accommodates the national lycomn or college, the public library, and the Institute Professional, a college for practical sciences. Pop. (1881) 8440. See Fonseca, Historical and Archaelogical Sketch of Gou (1878), and Lady Burton's Arabia, Egypt, India (1879).

Goalanda, a market-town of Bengal, situated on a tongue of land at the confluence of the main streams of the Ganges and Brahmaputra, has become within a few years an important entrepôt for the river trade, the terminns of the Eastern Bengal Railway, and the starting-point of the Assum steamers. Only temporary buildings are ereeted, as the floods of July have more than once swept away the more expensive masonry structures. Busy markets are held daily, and the river is crowded with native eraft, in which most of the trade is carried on, and fishing-hoats. Pop. (1872) about 1000; (1881) 8652.

Goalpara, the most westerly district of Assam, on both sides of the Brahmaputra, and bounded on the north by Blutan, with an area of 3897 sc. m., and (1881) 446,232 inbabitants. Earthquakes are cammon, and occasionally severe; the climate is regarded by both natives and Europeans as very unhealthy, especially during the rains.—Goalpara Town, on the Brahmaputra, is the only place in the district with over 5000 inhabitants. It has a considerable river trade. Pop. 6700.

Goat (Capra), a genus of runiuant ungulates, nearly allied to sheep. The horns, which consist of a solid core of hone and a horny sheath around this, differ from those of sheep in their position on the top of the head, in their backward enreature, and in being laterally compressed. They are roughened by transverse ridges, and are either keeled in front as in the common goat, or broad anteriorly and triangular in section as in the ibex. Though present in both sexes, they are larger (up to 3 feet) in the males, who use them as weapons in contests with rivals or foes. Goats are further distinguishable from sheep by the arched forehead, the straight nose, the beard on the chin, the short creet tail with little hair, the general absence of tear-pits and interdigital glands, the nature of the hair, which can hardly be called wool, and the disagreeable odour, which is especially strong during the breeding season. The curious, confident, caprations temperament of the goat is also different from that characteristic of sheep; but in regard to this and most of the other characters it must be allowed that they are not constant, and that the two types are very nearly allied.

Goats are confined to the monutainous parts of

Gots are combined to the modifiamous parts of the Old World, where they are found throughout the south European alpine region, from Spain to the Cancasus, and thence onwards through Armenia and Persia to the Himalayas and China. With the exception of a Neilgherry goat and an Abyssinian ibex, they are confined to the palearetic geographical region. Their remains are found in the Indian Phocene, if not also Miocene deposits, and include a hornless form, Bucapra daviesti.

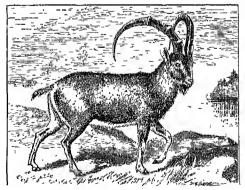
Goats are characteristically mountain-loving animals, climbing and leaping with murvellous dexterity. There does not seem sufficient warrant for believing the statement that the males of some species (e.g. C. wagagrus or C. ibc.) are able to save themselves in falling from a height by bending the head inwards and alighting on the massive horns. They feed on herbage of many kinds, and are unfortunately fond of young shoots of trees. The herds are usually small; the old males are cross and combative; the old females are said to act in

turn as sentries; the kids are very agile and graceful. The males differ from the temales in having stronger horns, thicker manes, and in slight colour distinctions. The breeding senson is in autumn; the gestation last-five months; the birth is single or double; and the kids follow the mother a few days after birth.

Goats have highly-developed senses of sight and smell, and are in many ways highly successful animals, swift in dight, bold in necessary attack, and well-adapted to their natural surroundings and mode of life. For general eleverness of climbing goats are deservedly famous, and in captivity they often exhibit daring and cunning. Romanes eites a case of one ringing a door bell when hungry for dinner, and two instances of the reasonable behaviour of two goats which met face to face on a narrow, rocky ridge, where the only action consistent with the life of both was that one should walk over the other, as accordingly happened. Their

over the other, as accordingly happened. Their rugnishness often suggests a faint sense of humour. The common domestic goat is a variety of the Wild Goat (C. hirrus) which inhabits the Taurus and other mountains of south-west Asia. Compared with its ancestor, the domesticated form is somewhat degenerate, being much reduced both in general size and as regards its horns. The domestication must have taken place at a very remote period, and spread from the East, probably through Egypt, westwards. A great number of breeds now exist, the pedigree of which has been of course complicated by varietal hybridisation, and it is at least possible that other species, such as the Grecian ilex, may in some cases have co-operated in the process. A most important variety, formed into a breed by artificial selection, is the Angora Goat (C. hirrus, var. angorensis), where almost the whole body is enveloped in that long, silky, white hair which is so familiarly valuable and comfortable. The Angora goat has been introduced into Cape Colony, Australia, and the United States. The Cashnere Goat (C. hirrus, var. laniger), from Tibet and Bokhara, is almost equally valuable, famishing the white to brown hair used in making Cashnere wares. It has been successfully acclimatised in France. A third variety, utilised in the same way, is the Mamber Goat (C. hirrus, var. nambrica), from Asia Minor and Tartary, distinguished by its long pendent ears. The Syrian goat, which also has long ears, is trained in the East to all manner of tricks—especially to balance itself on a slender pile of small wooden blocks, built up to a height of several feet.

The Bezoar Goat, Greeian Ibex, or Paseng (C.



The Bezoar Goat (Capra cegagrus).

agugrus), which ranges from the Greek Archipelago to Persia, was once in great repute on account of the supposed medicinal virtue of round concretions (or Bezoar balls, see Bezoar) formed, as in many other runninants, in the stomach. This is the wild goat that Homer refers to in connection with the Cyclops and Crete. The horns of the males bear strong tubercles in front; the heard is much developed; the general colour is reddishnown, with dark stripes here and there.

The Markhor (C. fulcaneri or megacors), from

The Markhor (C. fulconeri or megaceros), from Tibet, Cashmere, and Afghanistan, is a strong, powerful goat, with cork-ciew horns, much larger in the males, which are also distinguished by a thick mane on the neck and breast. Hunters credit it with killing and even eating serpents. Attempts at taming it in Europe have not been

rewarded with much success.

The Alpine Ibex, or Steinbock (C. ibec), is typical of numerous goats which some separate off as a distinct genns. The chief difference is that the horns are broad in front, triangular in section, without a keel, but with a series of autorior transverse ridges. Different kinds of ibex frequent the lofty monntains of Europe and West Asia—e.g. C. hispanica in the Sierra Nevadia, C. pyrenaica in the Pyrenees, C. cancasica in the Cancasus; but the distinctions are trivial, if not merely varietal. The Alpine ibex is a magnificent goat, without beard, but with very strong, slightly divergent, muchridged horns. It used to be abundant, but through over-hunting, both for sport's sake and on account of supposed medicinal virtues, has become nearly extinct. Victor Emmanuel saved it in fact just in time by strict preserving, and small herds, amounting in all to about 300, still live on the heights between l'iedunont and Savoy, especially in the Val-de-Cogne. Attempts at reintroduction have not been successful; in captivity the animals tend to become vicions, and the same is markedly time of hybrids between it and the common goat. In its native humbs it is said to surpass even the chamois in the certainty with which it estimates distances for extraordinary leaps.

Goats can be kept with advantage in situations

Gotts can be kept with advantage in stinations too rocky, or where the herbage is too scanty, for oxen or sheep. They were formerly kept in greater numbers in Britain than they now are. The goat is capable of the most perfect domestication, and becomes extremely attached and familiar. It is apt, indeed, to prove a troublesome pet, and makes use of its horns, although not angrily, much more freely than is at all agrecable. Goat and sheep may be successfully crossed, and the hybrids are to a certain extent fertile among themselves.

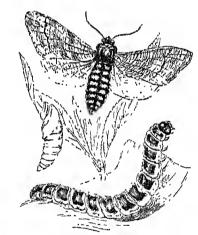
The uses of the goat are numerous. The flesh is good; that of the kid, or young goat, is in most countries esteemed a delicacy. Requiring but little attention, and able to subsist on rough diet, the goat is in many countries 'the cow of the poor.' The milk is very rich and nutritious, more easy of digestion than that of the cow, and often useful to consumptive patients. Some goats yield as much as four quarts of milk daily, although the average quantity is more nearly two. Both cheese and butter are made of goats' milk; they have a peculiar but not disagreeable flavour. Goats' milk is still very much used in Syria and other parts of the East, as it was in the days of the patriarchs. The skin of the goat was early used for clothing, and is now dressed as leather for many uses, particularly for making gloves and the finer kinds of shoes (see GLOVES). The hair, which may be advantageously clipped annually, is used for making ropes which are indestructible in water, and for making wigs for judges, barristers, and other functionaries. For the latter purpose the hair of white goats is used. Especially valuable of course are the Angora and Cashmere varieties. The horns are used for making knife-handles, &c., and the fat is said to be superior to that of the ox for candles.

Goats are sometimes employed in drawing children's coaches, to which as many as four are sometimes harnessed together, and they are sufficiently tractable and obedient to the rein.

But the economic importance of the goat is not altogether on the side of utility. It ruins young plantations and makes referesting in some cases impossible. According to Carl Vogt, the legend that the devil ereated the goat is justified by the animal's pernicions influence: 'It is the most destructive creature in the world in forests, and the old seats of civilisation—viz. the countries round the Mediterranean—owe the destruction of their forests, the nakedness of their mountains, and the inevitable consequence of that condition, the dryness of their climate, to the devastations of these animals.' In the same connection it may be noted that the goat, as destructive of the vire, was sacrificed in ancient times to Bacchus. See Angora Goat, Casimere Goat, Sheep. The Rocky Monntain Goat (q, v.) is an antelope rather than a goat. See H. S. H. Pegler, Book of the Goat (3d cd. 1883).

Goat, ROCKY MOUNTAIN. See ROCKY MOUNTAIN GOAT.

Goat-moth (Cossus ligniperda), a large moth common throughout Europe and Asia. It measures three inches or more across the wings, and has a thick heavy body. The general colour is yellowishingray; the upper wings are mottled with white, and marked with many irregular black lines; the lower are of an almost uniform ash-colour. The caterpillar is about three inches long when full-grown, and has a yellowish colour, the upper parts flesh-like, the head black. It inhabits and feeds on the



Caterpillar, Chrysalis, and Imago of the Goat-moth (Cossus ligniperda).

wood of willows, poplars, and elms, making holes large enough to admit a finger, and often causing the destruction of the tree. Its size, abundance, and voracity make it a formidable devastator of trees. When alarmed or hundled it emits a disagreeable goat-like odour, which cannot be removed from the hands even by frequent washings. It takes two or three years to attain maturity. The reddishbrown pupa is enclosed in a cocoon of chips cut by the jaws of the creature. The eaterpillar has been regarded by some as the cossus of Itoman epicures, but this was more likely the larva of some large bootle.

Goat's Beard (Tragopogoa) is a genus of plants of the natural order Composite. The common Goat's Beard (T. pratense), also known by

the name Go-to-bad-at-noon, from the circumstance of its closing its flowers about mid-day, is an abundant native of Britain. The plant is erect, the flower stems about 18 inches high, the root leaves 5 to 8 inches long, stem leaves shorter, with a dilated base, glabrons and slightly glaucous. The peduncles are long, thickened at the summit, and the flower-heads yellow. It is hiennial, and the roots, if taken before the flower-stems shoot up, and boiled, resemble asparagns in flavour, and are said to be nutritions. In some parts of France the fresh jnice of the young stems and leaves is believed by the common people to be an excellent solvent of bile. Salsify (T. porrifolium), also a native of Britain, is cultivated in gardens for the sake of its esculent roots, which are esteemed by some.

Goat's Rue (Galega), a genus of Leguminosa, of which one herbaceous perenuial species (G. officinalls) is sometimes cultivated like lucenc (especially in Switzerland) as a forage plant, on account of the great bulk of produce which it yields. Its peculiar smell is not relished by eattle unaccustomed to it. It was formerly also employed in medicine, but is now seldom heard of beyond the herbaceous flower-bonder.

Goatsucker, or Night-Jar, a name applicable to any member of the family Caprinulgide, allied to the swifts, included among the Passerine birds. They are almost cosmopolitan, noctavnal, superficially owl-like birds, with soft, nottled, predominantly brown and gray plumage, feeding usually on insects which they catch on their swift, silent flight, and notable for their eeric, often almost human like cries, which have awakened superstitions dread in the natives of all countries. The bill is short, with the upper part curved at the point, but the gape is extremely wide, and enclosed by a fringe of strong bristles borne along the margins of the beak. The eyes are very large and full; the hind toe can be directed forwards; in the great majority (Caprinulgine) the middle claw is a enrious comb; the second pectoral muscle is long; the oil-gland is small; there are after-shafts to the feathers.

The only constant British species is the night-jar, night-hawk, fern owl, churn owl, or night-churr (Caprimulgus curopæus), which stays from May to September, frequenting menlitrated, ferneovered ground or bushy places throughout the



The Night-jar (Caprimulgus curopœus).

country. With twisting flight and 'whirring' wings it hawks for insects in twilight or darkness, but will also bask in the sun. On a branch it sits lengthways, with the head low down, and when stationary the male utters his well-known 'churr.'

With the comb-like middle claw a night-jar in captivity has been seen to scratch the ground, but what it usually does with this instrument is uncertain. The plumage is gray, brown, and buff; the length about 10 inches. The eggs (two) are laid on the ground without a uest, and are 'creany white, marbled and veined in endless variety with brownish-black and purplish-gray.' The bird is widely distributed in Europe, North Africa, and as far east as North-west India. 'One of its lines of migration from Africa crosses Malta, where large numbers are shot for the table in spring.' Two other species of night-jar (C. ruficollis and C. agyptims) are noted by Howard Saunders as having occurred in Britain. See his Manual of British Birds.

Among the interesting members of the family, which includes about seventeen genera and ninety species, may be noted the Pennant-winged Night-jar (Cosmetornis vexillarius) and the Lyve-tailed Goatsacker (Macropsalis lyru), with elongated feathers on wings and tail respectively (see also Whip-roon-will). The South American genus Nyetibins differs from the ordinary goatsackers in several particulars—e.g. in having a smooth middle claw. It seems to connect them with the family of Podargide, the members of which—e.g. the 'frog-mouths' (Batrachostomus)—have a gape even wider than that of goatsackers. Allied also is the peculiar South American Oil-hird or Steatornis (see Guacharo). The family of Rollers (a.v. Corneiaday) is also nearly related.

even wher than that or goatsnekers. Affect also is the peenliar South American Oil-bird or Steatornis (see Guacharo). The family of Rollers (q.v., Coraciadar) is also nearly related.

The weird and often almost articulate eries of the goatsnekers—'who are you,' 'work away,' 'willy-come-go,' 'whip-poor-will,' &c.—have carned for the birds the reputation of auguring evil, while a more curious, and yet quite explicable popular notion is expressed in the modern title 'goatsneker,' or in Pliny's name Caprimudgus, or in Aristotle's Ligothelas. The notion suggested by these words is that the birds such the milk of goats, as Pliny definitely states. The truth and the origin of the mistake may be best expressed in Waterton's words: 'These innocent little birds never such the lierds; for when they approach them, and jump up at their ndders, it is to eateh the flies and insects there.' The animals are sensible of the birds' good offices, for they stand quietly and 'do not try to drive them off as uncivil intruders.' See Waterton's Wanderings in South America.

Gobbe, or Voandzou (Voandzeia subterranca), a leguminous annual of tropical Africa (sub-order Casalpinea), of which the young pod is thrust into the ground in the same manner as that of Arachis hypogaa (the Ground-bean, q.v.), thus at once protecting and planting the seeds. The rich oily seeds ('Angola pens') are wholesome and agreeable when boiled. The young pods also are used like French heaus.

Gobbo, Gobbio, or Gombo. See Hibiscus.

Gobelins, the name of a family of dyers, who in the 15th century established themselves in the Faubourg St Marcel, Paris. In the following century they added to their dyeworks a tapestry manufactory. In 1602 the establishments were purchased by Colbert, Lonis XIV.'s minister, and reorganised as royal upholstery works, celebrated painters, such as Le Brun and Vouct, being employed to furnish designs. From the year 1697 the tapestry manufacture alone was carried on, the product of the looms being known by the name of Gobelins. The works were closed during the Revolution and down to the restoration of the Bourbons, but since that time they have again been in active operation. A second establishment for the manufacture of Gobelins, likewise supported

by the state, exists at Beanvais. For other textiles of a similar description, see TAPESTRY.

Gobi, DESERT OF. See ASIA (Vol. I. p. 486), DESERT.

Goblin (Fr. gobelin, Low Lat. cobalus, Ger. kobold, Gr. kobalos), a mischievous sprite, also called Hobgoblin. See Demonology, Brownies.

Gobony, or Gobonated. See Bordure.

Goby (Gobius), a genus of eaunivorons shore fishes, abundant on all temperate, and yet more on tropical coasts. The genus is type of a family, Gobiidae, included among the acanthopterons bony fishes. The gobies are generally small; the bodies are sealy; of the two dorsal fins, the anterior has usually six flexible spinous rays; the ventrals are united to form an adhesive disc, by means of which the fishes cling to the rocks, withstanding the rush of the waves; there is no swinn-bladder. Their favonrite habitat is on rocky coasts; 'many,' Ginther says, 'seem to delight in darting from place to place in the rush of the water which breaks upon the shore;' others live in brackish water, and not a few have become acclimatised in lakes. In various degrees the gobies change their colour to



The Black Goby (Gobius niger).

suit the ground on which they rest. The males of some species build nests of seaweeds and sea-wreek, and watch these jealously till, and even after, the hatching of the eggs which their mates have laid. The genus includes about 300 species, of which several are common on British coasts. Of the latter

The genus includes about 300 species, of which several are common on British coasts. Of the latter the Black Goby (G. nigar) is the largest, but only measures 5 or 6 inches; G. ruthensparri, G. munches, G. paganellus, are other well-known species. They make interesting immates of aquaia. The White Goby (Latrunulus albus) is a very small transparent fish, found on some British and European coasts, remarkable as 'the first instance of an annual vertebrate,' for it seems only to live one year. There are munerous genera very nearly related to Gobins, while not far off is the genus Periopthalmus, the members of which have greatly protruded eyes and are aconstoned to hunt along the ebb-tide shore, hopping and leaping with some agility. The Dragonets (q.v.) are also allied. See Günther's Study of Fishes (Edin. 1880).

God. See RELIGION, THEISM.

God'alming, a municipal borough of Surrey, 34 miles SW. of Londou. Hither in 1872 the celebrated school of Charterbouse (q.v.) was removed from London. Pop. 2505.

Goda'vari, one of the principal rivers of India, and the largest of the Decean, rises within 50 miles of the Indian Ocean, and flows south-east across the peninsula into the Bay of Bengal, which it enters by seven mouths, after a course of 898 miles, its total drainage area being estimated at 112,000 sq. m. For some miles before the river bursts through the barrier of the Eastern Ghâts, its picturesque seenery has earned for it the name of the Indian Rhine; its stream, which, after receiving the Manjera, the noble Pranhita, the Indravati, Tal, and Sabari, has attained a breadth of from one to two miles, is here contracted by precipitous banks, until the whole volume of water

pours through a rocky gorge 200 yards wide. The magnificent anicut or dam at the head of the delta, throwing off three main canals with a distributing length of 528 miles, deserves notice; thus irrigated, the entire delta has been turned into a great garden of perennial crops. The navigation of the upper waters is impeded by three impassable rocky barriers or rapids within a space of 150 miles; the works undertaken in 1861 to remove these obstructions, or to pass them by means of canals, were abandoned ten years later. The Godavari is one of the twelve sacred rivers of India, and the great bathing festival, called Pushkavam, is beld on its banks once in twelve years; each of its seven mouths is esteemed holy, but especially the Gantami mouth of the more northerly and larger of its two arms, which enters the sea not far from Cocanada.—The district of Godavari, lying between the Nizam's dominions and the sea, embraces the entire delta, has an area of 7345 sq. m., and a pop. (1881) of 1,791,512. The chief town is Cocanada (q.v.).

Goddard, Arabella, pianist, was born near St Malo, in Brittany, in 1836, and received lessons from Kalkbremer, Thalberg, and Macfarren. She made her début at the Grand National Concerts in London in 1850, and in 1854-56 performed with great success in the principal cities of France, Germany, and Italy. In 1860 she married Mr Davison, a musical critic. She took her farewell of the British public in 1873, and then made a tour to Australia, the Sandwich Islands, and the United States, returning to England in 1876.

Godefroy, Friederic, a learned French lexicographer, was born at Paris in 1826. His Lexique comparé de la Langue de Corneille (2 vols. 1862) preluded his splendid Histoire de la Littérature française depuis le XVI. Siècle (8 vols. 1859-78), and his magistral and voluniums Dictionnaire de l'ancienne Langue française (1880, et seq.).

Goderich, a port of entry of Ontario, on Lake Huron, 180 miles WNW. of Buffalo by rail, with a good harhour protected by a pier, also several factories and mills, and eight salt-wells. Pop. 4564.

Goderich, Viscount, a British statesman, afterwards Earl of Ripon (q.v.), who was head of the short-lived Goderich administration (1827–28).

Godesberg, a village of Rhenish Prussia, on the Rhine, 4 miles S. of Boun. It has a mineral spring, and a pieturesque ruined eastle (1213). Pop. 2901.

Godfather and Godmother (also called Sponsors), the persons who, by presenting a child for the sacrament of baptism, which is regarded as a new spiritual birth, are reputed to contract towards the newly baptised the relation of spiritual parentage. In the Roman Catholie Church this spiritual relationship is regarded as a species of kindred (whence the name gossip, or God-sib, 'spiritually akin'), and constitutes an impediment of marriage between the sponsors upon the one hand and the baptised and the parents of the baptised on the other. Anciently, this impediment arose also between the sponsors themselves; and it still extends much further in the Eastern than in the Western Church, although in the former it can arise only from baptism, whereas in the Roman Church the eandidate for confirmation also is presented by a sponsor, though usually one of the same sex.

In the Anglican Church, by whose rule two godfathers and a godmother are required at the baptism of a male, and two godmothers and a godfather at that of a female, no impediment of marriage arises from the relation of the sponsors to the baptised. The parents of the baptised are not permitted to act as sponsors in the Roman Catholic Church, one of the objects of the institution being to provide instructors in ease of the death of parents; but the present rule of the Church of England, following the rubric of the American Prayer-book, does so allow.

Godfrey, SIR EDMUNDBURY. See OATES (TITUS).

Godfrey of Bouillon, a typical representative of Christian chivalry, was born about 1061, at Baisy, a village of Belgian Brahant, the eldest son of Count Enstace II. of Boulogne, and Ida, sister to Godfrey, Duke of Lower Lorraine and Bouillon. He served with great gallantry under the Emperor Henry IV., both against Henry's rival, Rudolph of Swahia, and in 1084 in the expedition against Rome. Five years later the emperor invested him with the ducly of Lower Lorraine. Godfrey joined the first crusade, and was elected one of the principal commanders. For an account of his career in the East up till the taking of Jerusalem, see Crusades. Eight days after the capture of the Holy City Godfrey was proclaimed king by the crusading army; but his piety and humility forbade him to 'wear a crown of gold where his Saviour had worn one of thorns.' He accordingly contented himself with the title of Defender and Chardian of the Holy Sepalelme. On 12th August 1099, on the plain of Ascalon, Godfrey defeated the sultan of Egypt; this victory put him in possession of the whole of Palestine, a few fortified towns only excepted. After a year spent in organising his new state, Godfrey died, 18th July 1100. See De Hody, Godfrey died, 18th July 1100. See De Hody, Godfrey died, 18th July 1100. See De Hody, Godfreydied de Bouillon (2d ed. Tournai, 1859); and Froboese, Gottfried von Bouillon (Berlin, 1879).

Godfrey of Strasburg. See Gottfried.

Godiva, LADY, the famous patroness of Coventry, who built herself an everlasting name by an annexampled deed of magnatimity and devotion. About the year 1040 Leofric, Earl of Mercia and Lord of Coventry, imposed certain exactions upon the inhabitants, hard and grievous to be borne. His wife, the Lady Codiva, besought her husband to give them relief, and pleaded so carnestly that, to escape from her importunities, the earl said he would grant her the favour, lint only on the inpossible condition that she would ride naked through the town. Godiva ordered proclamation to be made that on a certain day no one should be in the streets, or even look from their houses, when, delethed on with chastity,' she rode through the town; and her husband, in admiration of her intrepid devotion, performed his promise. This circumstance was commemorated by a stained-glass window, mentioned in 1690, in St Michael's Church, Coventry; and the legend that an infortunate tailor, the only man who looked out of a window, was sterick blind, has also found coma window, was struck blind, has also found commemoration in an ancient elligy of 'Peeping Tom of Coventry,' still to be seen in a niche of one of its buildings. The story occurs in most chroniclers who deal with the time of Edward the Confessor, although it is true that there is no narrative of it earlier than three centuries after. The earliest version is that in the English chronicle usually ascribed to Brompton (close of 12th century), quoted in Dugdale's History of Warwickshire, and followed with some variations by Matthew of Westminster, and Higden. Cox makes bold to connect Peeping Tom with the universally spread story of the Master-thief, and notes that the story of Godiva, slightly altered, is told again in the tale of Allah-nd-deen (Thousand and One Nights), who sees through a crevice the king's daughter on her way to the bath, when it is death for any one to be seen abroad or to be found looking at her. Part of the civic procession at the opening

of the great fair of Coventry used formerly to be a representation of the ride of Lady Godiva. It continued at intervals of from three to seven years, until 1826, and was revived with great splendom in 1848. But the ceremony has now fallen into discepute, and such attempts as have been made to revive it have not commended themselves to the best citizens of Coventry. There is a poor hallad on the subject entitled 'Leoffrieus' in the Percy Folio MS, and in the Collection of Old Ballads (1726). The story has been gracefully re-told by Leigh Hunt, and in noble verse by Tennyson. See Felix Liebrecht's Zur Volkskunde (1879), and a study by E. Sidney Hartland in the Folklore Journal for 1890.

Gödöllö, a market-town of Hungary, 15 miles NE, of Pesth, with a royal castle and park presented by the Hungarians in 1867 to their king, the emperor of Austria-Hungary. Here, on 7th April 1849, the Austrian forces were defeated by the Hungarians. Pop. 3940.

Godolphin, Sidney Godolphin, Earl of, who under four sovereigns occupied a seat at the Treasury Board, and under Anne filled the office of Lord High Treasurer solus, was descended of good English family, and was born at Godolphin Hall, near Helston, in the extreme south of Cornwall, in the summer of 1645--he was baptised on 15th July. Introduced at court as a royal page in 1664, he four years later accompanied his kinsman Sir W. Godolphin on a mission to Spain. But his first important public work was performed as envoy-extraordinary to the Netherlands in 1678, where he became acquainted with the Prince of Orange and with Sir William Temple. After his return to England he secured a seat in the House of Commons, and in 1679, on the recommendation of Temple, was appointed a commissioner of the Treasury, Although he voted for the Exclusion Bill, he was nevertheless in 1684 made First Commissioner of the Treasury, and also elevated to the pecrage. On the accession of James II. Godolphin was indeed removed from the Treasury, but received compensation therefor in the appointment of chamberlain to the queen. His services as an administrator of the finances of the kingdom were, administrator of the mances of the Kingdom were, however, valued so highly that in 1686 he was recalled to the Treasury. On William of Orange's landing in 1688 Godolphin stood firmly by James, and was left, along with four others, in charge of the government when the king fled from London. He was also chosen, along with Halifax and Nottingham, to treat with William; and, when James's light from the country was known Godolphin was dight from the country was known, Godolphin was one of those who voted for a regency. Yet no sooner was William proclaimed king than, on 14th February 1689, he reinstated Godolphin in bis old Godolphin was a Tory; and, when William began to replace his Tory ministers by Whigs, the turn came to Godolphin—but came last, in 1696—to go likewise. In 1700, however, he once more returned to his old place; yet he only held office on this occasion for about six months. When Anne succeeded to the throne she made Godolphin (on 6th May 1702) her sole Lovel High Transpore. This May 1702) her sole Lord High Treasurer. This position he filled down to 1710. The personal friend of Marlhorough, he steadily supported the great general all through the war, enabling him by his thrifty and able management of the finances to conduct one brilliant campaign after another without suffering embarrassment from lack of supplies. And this feat Godolphin was able to achieve without increasing the public debt by more than about one million sterling annually—a most eloquent witness to his ability, sagacity, and sound administrative talents. He warmly advocated the union

between England and Scotland, which was indeed effected before he laid down the staff of ollice. As Harley's friend and relative, Mrs Masham, As Harley's friend and relative, Mrs Masham, erept further and further into the good graces of Anne, Harley himself began to prove more and more a thorn in the flesh to Godolphin. At length the latter, to prevent his own overthrow, constrained Anne to dismiss Harley. Godolphin's behaviour at this juncture, and his attitude towards the sovereign, mark the transition from the old order of things, when the king (or from the old order of things, when the king (or queen) appointed his own ministers, and dismissed them, according as he thought lit, and the new order of things, under which the ministers are appointed by the chief adviser of the crown. And appointed by the enter activise of the course and the prefine to his own; for, the influence of Mrs.

Laboratory. But the dismissal of Harley was the prefined to his own; for, the influence of Mrs. Masham continuing to increase, and the power of Harley to grow in a corresponding degree, Godolphin's necessarily diminished, and on 8th November 1710 he was enrily dismissed by Anne. He only survived about two years, dying on 15th September 1712 at Holywell House, Marthorough's seat, near 8t Albans. He was married for three years (1675-78) to Margaret Blague, the excellent lady whom Evelyn knew, and whose life he wrote. Godolphin was neither a brilliant man, nor an eloquent speaker, nor a great statesman; but rather a sagacious, cantious, very able administrator. He was not a man of strong political bias, and in his day it must be remembered political parties were not what they are at the present time. As an excellent official of the Treasury he doubtless saw no reason why he could not serve equally well whoever happened to be master of the land for the whoever happened to be master of the land for the time being. At all events, he was an incorruptible official, though some have doubted whether he was not a double-dealing politician, and some have indeed accused him of being such. In private life, at least in his later years, he was fond of horseracing and gay life. See the Hon. Hugh Elliot, Life of Sidney, Earl Godolphin (1888).

Godoy. See ALCUDIA.

God save the King. See NATIONAL HYMNS.

God's Truce. In the 9th and 10th centuries, when the empire of Charlemagne had begin to break up into small fragments—countships, dukedoms, baronies, &c.—the right of private war and private vengeance, which had been traditionally practised by the early Teutonic races, threatened to become a source of anarchy and dissolution, instead of what it was intended to be, a rough and ready method of enforcing equity between man and man. Accordingly the church, as the guardian of justice and the preserver of moral order, stepped in, and at the end of the 10th century formulated stern ecclesiastical penalties against all who, whilst waging feudal war, should violate the peace of churches, priests, and the tillers of the soil. The God's Truce, technically speaking, was a ununal agreement, confirmed and sanctioned by the church, on the part of the barons and nobles of a particular district, to abstain altogether from private war on and between certain fixed days and times, and to respect permanently the rights and liberties of those who followed purely pacific eallings. This movement had its origin in the south of France, having how first cat. having been first set on foot at a synod held at Tuluges, in Roussillon, in 1027. Fourteen years later it curbraced the whole of France; and from there it spread rapidly into Germany, Italy, Spain, and England. About 1041 the main provisions of the Peace of God (treuga Dei) were these: Peace was to last from Wednesday evening to Monday morning in each week, also during Advent and Lent, and on certain of the principal saints' days and holy days of the church; the punishments for contunacy and disobedience were money fines, banishment for a long term of years, and excommunication; protection was specially extended to all women, pilgrims, priests, travellers, merchants, and agriculturists, and also to the farm implements and live-stock of the peasantry. The Pease of God was confirmed by several councils of the clurch, more especially by that of Clermont (1095), when Urban II, proclaimed its universal extension throughout Christendom. With the gradual consolidation of the kingly power in the larger monarchies during the course of the 13th century this institution fell into desnetude, its place being taken by the stronger executive of the kings. See Semichon, La Paix et la Trève de Dica (1857).

Godwin, Earl of the West Saxons, the greatest Englishman in the first half of the 11th century, was most probably son of the South-Saxon Wulfnoth, who was outlawed in 1009, and regained his father's lands by his conduct in the contest with Caunte; but according to others his father was merely a churl, and Godwin found means to ingratiate himself with Earl Ulf, the brotherto ingratiate himself with Earl Ulf, the brotherin-law of King Cannte. At anyrate, by 1018 he
was an earl, and the year after he married the
daughter of Ulf, and soon became Earl of the
West Saxons. In 1042 he took the foremost
part in raising Edward to the English throne, and
was rewarded by the marriage of his heautiful
daughter Edith to the English king—a union which,
however, turned out imhappily. Godwin had to however, turned out unhappily. Godwin had to lead the struggle against the worthless king's fondness for foreign favorities, and thus drew upon himself the violent emnity of the court party. With more than feminine bitterness and spleen, the numanly king revenged himself by heapthe munanly king revenged himself by heaping insults upon Queen Edith, seized her dower, her jewels, and her money, and, allowing her only the attendance of one maiden, closely confined her in the monastery of Wherwell. Godwin and his sons were banished, but they contrived to keep alive the antipathy of the English to the Norman favourities of Edward, and in the summer of 1052 landed on the southern coast of England. The royal troops, the navy, and vast numbers of the burghers and peasants went over to Godwin; and finally the king was forced to grant his demands. burghers and peasants went over to Godwin; and finally the king was forced to grant his demands, and replace his family in all their offices. Godwin died 7th April 1054. His great-hearted son Harold was for a few months Edward's snecessor on the throne. See the appendices to vols. i. and ii. of Freeman's History of the Norman Conquest.

Godwin, Francis, was born at Havington in Northamptonshire in 1561, the son of the Bishop of Bath and Wells. Elected a student of Christ Church, Oxford, in 1578, he graduated in 1580, next took orders, and was in succession rector of Sampford and viear of Weston-Zoyland, both in Somersetshire. With Camden he journeyed through Somersetshire. With Camden ne journeyed through Wales in 1590. Already sub-dean of Exeter in 1587, he was made in 1601 Bishop of Llandaff for his Catalogue of the Bishops of England, and was translated to Hereford in 1617. He died in 1633. His name is now remembered, not for his Rerum Anglicarum Annales (1616), but for his fanciful story, The Man in the Moon, or a Discourse of a Voucae thither. by Domingo Gonsales. Discourse of a Voyage thither, by Domingo Gonsales. It was translated into French and imitated by Cyrano de Bergerae, who in his turn undoubtedly ornande Bergerae, who in instant intendenced influenced the voyage to Lapita episode in Swift's Gulliver's Travels. Godwin's Nuncius Inanimatus in Utopia (1629, but soon suppressed) must have suggested Wilkins' well-known Mercury, or Swift and Secret Messenger.

272 GODWIN

Godwin, MARY WOLLSTONECRAFT, the proto-Hoxton, 27th April 1759. Of Irish extraction, she was the second of six children; her father, Edward John Wollstonceraft, a drunken ne'er-doweel, who squandered £10,000, and was always Shifting about—to Edmonton, Barking, Beverley, Hoxton once more, next Langharne in Carmarthenshire, and Walworth. At nineteen Mary went out to earn her own livelihood, and for ten years was a companion at Bath, a schoolmistress at Newington Green, and governess in Lord Kingsborough's family at Mitchelstown, Dublin, and Bristol. Of those ten years the chief events were her mother's death (1780); the flight of a sister, with Mary's help, from a brutal husband (1784); and a visit to Lisbon to nurse a dear dying friend (1785). Then in 1788, about which time she gave up church-going, she turned translator and literary adviser to Johnson, the Loudon publisher, who the year before had paid her ten guineas for her Thoughts on the Education of the Loudon business for her Thoughts on the Education of the Loudon business for her Thoughts on the Education of the Loudon business for her Thoughts on the Education of the Loudon business for her Thoughts on the Education of the Loudon business for her Loud cation of Daughters. In this capacity she became acquainted, not only with the literati of the day, but with reformers—Paine, Priestley, and the painter Fusch. That acquaintance here twofold fruit. On the one hand, in 1791, she produced her Answer to Burke's Reflections on the French Revolution, and in 1792 her Vindication of the Rights of Woman, a book, dedicated to Talleyrand, which made her both famous and infamous. On the other hand her friendship for Fuseli ripened into love, and 'to snap the chain of this association' (for Fischi was a married man) she started alone for Paris in the winter of 1792. There, as a witness of the 'Terror,' she collected materials for her valuable but never-finished Historical and Moral View of the Franch Revolution (vol. i. 1794); and thore, in April 1793, she met Captain Gilbert Imlay, an American timber-merchant, the author of A Topographical Description of the Western Territory of North America (1792). In April 1794 at Havre she bore him a daughter, Fanny; in November 1795, after a four months' visit to Scandinavia as his 'wife' and accredited agent, she tried to drown herself from Putney Bridge. Imlay, whom she adored, had cruelly described her. Fuseli was a married man) she started alone for Inday, whom she adored, had cruelly deserted her. But soon she resumed her old tasks; soon, in nine nonths' time, sho was living, or rather not living, with Godwin, for both kept their separato lodgings in Somors-town. They had first met in 1791. On 30th August 1797, five months after their marriage, she gave birth to a daughter, Mary; on 10th September she died. In 1851 a railroad threatened her willow sheded even in OM St. Parcara's days of them. her willow-shaded grave in Old St Paneras' church-yard, so her remains and Godwin's were removed to Bournemonth.

The Vindication, whose text is the equality of the sexes, is a enrious medley of genius and turgidity, roligion and over-outspokenness; it was years in advance of its age, if only in its advocacy of government day-schools. We may like or dislike the writer; we cannot but love the woman, for the love that all children boro her, for her own steadfast love towards her two ingrate sisters, and for the loveliness, pure and pensive, of her face—we know it by Opic's canvas.

Among her other writings were Original Stories for Children (1791; illustrated by Blake), Letters written during a Short Residence in Sweden, Norway, and Den-mark (1796), and Posthumous Works (4 vols. 1798), these Inst comprising The Wrongs of Women: or Maria, a Fragment, and the passionate Letters to Imtay (now ed., with memoir, by C. Kegan Paul, 1879). See, too, the Memoirs by Godwin (1798) and Mrs Pennell (Eminent Women's series, 1885).

Godwin, William, political writer and novelist, was born 3d March 1756 at Wisbeach, hut passed his boyhood at Guestwick in Norfolk. He

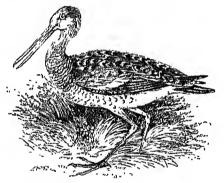
was the seventh of thirteen children. His father (1723-72) was a dissenting minister, by Godwin's showing a featureless precisian; the mother, we know from her letters, was a homely, good, lovable woman. After three years at Hindolveston day-school, three more with a tutor at Norwick, and one as usber in his former school, Godwin in 1773 entered Hoxton Presbyterian College; in 1778 quitted it as pure a Sundemanian and Tory as he had gone in. But during a five years' ministry at Ware, Stowmarket, and Beaconsfield, he turned Socinian and republican, and by 1787 was a 'com-Socinian and republican, and by 1787 was a 'complete nubeliever.' Meanwhile he had taken to literature, in 1783-84 writing three novels for £42, a Life of Chatham, and Sketches of History, in Six Sermons, with a good deal of subsequent hackwork. The French revolution gave him an opening, and his Engury concerning Political Instite (2 vols. 4to, 1793), brought him fame and a thousand oniness. It was calculy subversive of eventthing gnineas. It was calluly subversive of everything (law and 'marriage, the worst of all laws'), but it preached down violence, and was deemed caviare for the multitude, so its author escaped prosecu-tion. The Adventures of Culch Williams (1794) was designed to give 'a general review of the modes of domestic and nurceorded despotism, by which man becomes the destroyer of man; ' unlike most novels with a purpose, it is really a strong book, one that will not be forgotten. Holeroft, Horne Tooke, and ten others were charged at this time with high-treason; Godwin's powerful defence of them in the Morning Chronicle did much to break down the charge. Holcroft was one of his oldest down the charge. Holcroft was one of his oldest and most intimate friends, whose circle at different times included (or excluded) the publisher Johnson, Dr Parr, Thomas Wedgwood, Coleridge, Wordsworth, Mackintosh, Lamb, Hazlitt, Mrs Inchbald, Mrs Opic, Mrs Siddons, Sholley, and Bulwer Lytton. Through Johnson it was that Godwin met Mary Wollstonecraft, and it was for fear Johnson might cut off her supplies that their marriage was at first kept a secret. For Godwin was hard up, and hard up he continued almost to the last. Why, is somewhat a mystery, for his yearly oxponditure in 1793-95 averaged only £120, and the man who could write that memoir of his and the man who could write that memoir of his and the man who could write that memor of ms dead wife, and publish the Letters to Inday, should surely at least have died rich. Still, horrowing £50 from Wedgwood, and going on a driving tour; sending £20 to a young protege, and touring two months in Ireland, but failing to repay Ritson £30; horrowing other £100 of Wedgwood, but dispersion that the fact of \$100 or Wedgwood, but dispersion that the fact of \$100 or Wedgwood, but dispersion that the fact of \$100 or Wedgwood, but dispersion that the fact of \$100 or appointing Holcroft of £200—muddlement such as this speaks much for itself, if little for philosophy; and besides there was Godwin's family. It was a mixed one, if not very large. In 1801, after two unsuccessful courtships, he married the bustling widow, Mrs Clements or Clairmont, his next-door neighbour, who one day had accosted him from her baleany: 'Is it possible that I behold the immortal Godwin?' She had two children already, and a third was born of the marriage, So there were poor Fanny Imlay (1794-1816), who died by her awn hand; Mary Wollstonecraft Godwin (1797-1851), who in 1816 married Shelley; Charles Clairmont; 'Claire' Clairmont (1797-1879), the mother by Byron of Allegra; and William Godwin (1803-28), the worthwave never the Clair of Charles (1803-1804), where we work the content of 32), to whose posthimons novel, Transfusion, a memoir was prefixed by his father.

The last half of Godwin's long life may be briefly

dismissed. A bookselling business, undertaken by him as 'Edward Baldwin' in 1805, involved him for years in difficulties, and in 1833 he was glad to accept the sinceure post of yeoman-usher of the Exchequer. His tragedy, Antonio (1800), was hopelessly damned; nor were any of his later prose works equal in either merit or success to Political Justice and Culeb Williams. The best are St Leon (1799), a 'story of the miraenlous,' and an Essay on Sepulchres (1809). A Life of Chancer (1803), an Answer to Malthus (1820), Lives of the Necromancers (1834), and the novels Electrocod (1805), Mandeville (1817), and Cloudesley (1830) may be named. Godwin died in Palace Yard, 7th April 1836. 'Pecksniff, with a dash of Micawber, will seem a harsh verdict on one for whom Mr Kegan Paul has little save praise in his valuable and exhaustive biography, William Godwin: his Friends and Contemporaries (2 vols. 1876). See, too, Hazlitt's Spirit of the Age (1825); Leslie Stephen's English Thought in the 18th Century (1876); and other works cited at Shelley.

Godwin-Austen, the second highest peak in the world, is situated in the Himalayan system, in the western range that is crossed in the east by the Karakoram Pass. Its height is 28,250 feet. Distinguished in the records of the great trigonometrical survey only by the sign K2, it was named in 1888 after Lient.-colonel Godwin-Austen of the Trigonometrical Survey of India.

Godwit (Limosa), a genus of birds of the snipe family (Scolopacide), with very long bill, slightly eurved upwards, and long slender legs, with a great part of the tibia bare. All the species frequent marshes and shallow waters, chiefly those of the sea-coast, where they seek their food like snipes by wading and by plunging the long bill into the water or mud. They sometimes also run after small crustaceans or other animals, and catch them on the sands from which the tide has retired. Two species, the Black-tailed Godwit (L. belgica) and the Bar-tailed Godwit (L. lapponica), are as birds



Bar-tailed Godwit (Limosa lapponica).

of passage not unfrequent visitors of the marshy parts of the east coast of England, where the first used to breed. Nowadays the bar-tailed species is much the commoner, being especially abundant on the coast of Northumberland. Both normally breed in more northern countries, and are seen in Britain chiefly in their migrations northward and southward. Both have a wide range in Enrope, Asia, and Africa. The females are larger than the males, and the whole length of the female black-tailed godwit, which is rather the larger species, is about 17 inches, the bill alone being 4 inches long. They are much esteemed for the table, and are sent from Holland to the London market.

GOES, or TER GOES, a town of Holland, on the island of South Beveland, 16 miles NE. of Flushing by rail. It contains a fine Gothic church of the 15th century and a mined castle. Pop. 6393.

Goethe, Johann Wolfgang, was born in Frankfort-on-the-Main, August 28, 1749. His father was a Doctor of Laws and obtained the title of imperial conneillor. He was a man of honour-

able life, vigorous character, steadfast, industrious, and methodical; he possessed considerable enlture, and was a special lover of Italian literature and Goethe's mother (1731-1808), daughter of J. W. Textor, chief-magistrate of Frankfort, was only eighteen when her son was born; she was remarkable for her bright temper and good sense. One child besides Goethe lived to adult years—his sister Cornelia, the companion of his youth (married 1773 to J. G. Schlosser, died 1777). The family occupied a house in the Hisehgraben, the rebuilding of which was a notable event in Goethe's boyhood. There was untel in the life of the old free imperial city to stimulate his enriosity and awaken his imagination. He was quick to learn, and had the advantage of careful instruction from his father and from thitors. In 1759 French troops, siding with Austria in the Seven Years' War, entered Frankfort, and Count Thorane, a French officer, a enlityated man and a learner of cut was quantumly Carlothele with the Thorane. lover of art, was quartered in Goethe's house. French theatre opened in the city attracted the boy, and thus he became familiar with Racine and more recent dramatists. He even attempted to compose in the manner of some of these, while also he was receiving literary influences from the lyrical poets of Germany. Latin, Greek, Italian, English, even Hebrew, were studied, and he planned a kind of prose fiction maintained by several correspondents in various languages. He had his moods of religious feeling, which at an early age were somewhat disturbed by doubts of (4od's goodness suggested by the Lishon earthquake. The primitive, pastoral scenes of the Old Testament had a peculiar charm for his investigation. But while an earthquake tradent for his imagination. But while an ardent student in so many directions, he enjoyed the amusements of a boy among boys, and sometimes indeed among ill-chosen companions. When about fifteen years old (1763-64) he underwent a boy's joys and sorrows of love; Gretchen was of lumbler rank than his own, and was some years his senior. She treated him as a child, and, circumstances having hought to light Goethe's wanderings in doubtful company, the pair were parted. For a time Goethe gave himself up to bitter feelings.

In the autumn of 1765 he was admitted a student of the university of Leipzig. He cared not at all for his law lectures, and not much for Gellert's lectures on literature or Ernesti's on Cicero's De Oratore; the awakening of his critical powers for a time damped his ardour for composition, and he fell into a melancholy mood. Companionship ronsed him to activity. The serious Schlosser, afterwards his brother-in-law, widened his range of literary sympathies; Behriselt served him as a severe yet kindly critic; but it was from Oeser, director of the academy of arts, and the friend of Winckelmann, that he received the most important intellectual gains of this period. 'Oeser,' he wrote, 'taught me that the ideal of beauty is simplicity and repose.' Goethe took lessons in drawing, tried to etch, studied the paintings at Leipzig, and visited the Dresden gallery. He read with enthusiasm Lessing's Laocoom and his Minna von Barnhelm, heard concerts, and was frequent in his attendance at the theatre. Nor in Goethe's life could much time ever pass without tho presence or the incursion of love. His Frankfort fancy for Charitas Meixner faded before the stronger attraction of Käthehen Schönkopf (the Aennehen of his autobiography), danghter of a wine-seller at whose house he dired, a bright, frank girl, three years his senior. He began for her (1767) the little pastoral drama in Alexandrine verse, Die Launc des Verliebten (known to us in a revised form), to atone for his jealous lumnonrs. At Leipzig in 1768 he began a second play, painful in subject, Die Mitschuldigen, afterwards finished in Frankfort. A group of songs set to music by Breitkopf belong also to the Leipzig

274GOETHE

Käthchen was wooed and two years later was won by the advocate Kanne. The friendship which Goethe had for Oeser's delightful daughter

When Goeine had not be classed among his luves.
On September 3, 1768, Goethe was again in Frankfort, scriously ill; it was feared that his lungs were affected. For the greater part of the following year he remained an invalid, and during this illness he sought religious consolation under the direction of his mother's friend, Frünlein von Klettenberg, one of the Moravian Brethren. Under her guidance and that of his doctor he made a study of alchemy, a subject not forgotten when he afterwards wrote Faust. Gradually health returned, and it was decided that he should complete his studies at the university of Strashurg. In April 1770 he arrived at the old city and saw for the first time its cathedral, which by and by made him a deeply-interested student of Gothic architecture. At the table where he dined he found lovers of literature in Lerse and the actuary Salzmann, and a man of a singular religious spirit in Jung Stilling. Goethe's pictistic fervour declined as he carnestly devoted himself to chemistry, anatomy, literature, antiquities, and, as far as was necessary, to his proper study, law. He had the good fortune to come under the influence of Herder, already known as an anthor, and through Herder he came to feel the attraction of old ballad poetry, of Ossian, and in a new and higher degree the power of Homer and of Shakespeare. Herder was well acquainted with English writers of his own century, and Goldsmith's Vicur especially delighted Goethe. When smith's Vieur especially delighted Goethe. When (October 1770) he made the acquaintance of Pastor Brion's family at the village of Sessenheim, it seemed to him that the Primrose household stood before him. The pastor's beantiful daughter, Friederike, eighteen or nineteen years old, and as good as she was beautiful, filled his heart with a new love, which she modestly yet ardently returned. She was the inspiration of some of Goethe's leveliest lyrics. But he would not or could not fettor his freedom, and he parted from her not without some sense of self-reproach. Having obtained his doctor's degree, he returned (August 1771) to his native city.

Admitted an advocato, Goethe had no heart

in his profession. His creative genius was fully roused, and when he read Shakespeare he felt himself moved to something like rivalry. In Goetz von Berlichingen, the German champion of freedom in the 16th century, he found a dramatic hero. He completed his play of Goetz, in its earliest form, before the close of 1771, and named it a dramatised history rather than a drama. In the following year he was engaged in critical work for the Frank. furter gelekrie Anseigen, edited by a friend recently made, J. H. Merek of Darmstadt, a man of fine taste, somewhat cynical, and yet capable of generous admiration for one whose genius he was prompt to recognise. To this period belong the strikingly-contrasted poems Der Wanderer and Wanderers Sturmlied, the former telling of the beauty of ruined classic art amid the ever-living freshness of nature, the latter an improvisation of tempest and the genius of man which can defy the

fury of the elements.
To gain further knowledge of law procedure Goethe settled for the summer (May-September) of 1772 in the little town of Wetzlar, the seat of the imperial courts of justice. His thoughts were, however, more with Homer and Pindar than with matters of the law. The months are memorable chiefly for Goethe's love for Lotte Buff, daughter of a steward of lands belonging to the Teutonic Order of Knights. Her brightness, her ingennous goodness, her kind and graceful rendering of household duties charmed Goethe; but she was the betrothed of Kestner, the Gotha Secretary of Legation, and Goethe, as it has been described, 'saved

himself by flight.

Before returning to Frankfort he visited the authoress, Frau von Laroelle, near Coblentz, and was interested in her dark-eyed daughter Maximiliane, soon to be the wife of the Italian Brentano. When once more at home he occupied himself with an essay on architecture, biblical studies, and the design for a dramatic poem on Mohammed. Early in 1773 he set himself to reeast the Goetz, and this great work was ready for the printer in March of that year. Its fame was secured by the fact that it expressed with the energy of genius much of the passionate striving after freedom of thought and action characteristic of his own time; its romantic revival of the past fell in with another tendency of the age. A fervour of creation now possessed Goethe. To 1773 belong works of the most varied description, his majestic *Prometheus*, an important group of satisfical farees, the comedy of Erwin and Elmire (linished June 1774, founded on Goldsmith's Edwin and Angelma), and already he was engaged on Faust and on Worther. He had heard some time previously of the suicide of young Jernsalen, a Wetzlar acquaintance, and weaving the story of Jerusalem with that of his own love for Lotte Buff, and adding something derived from the character of the jealous Breutano, he profrom the character of the jealons Brentano, he produced his wonderful book Die Leiden des jungen Werthers (finished March 1774), which gives as in an essence all the spirit of the 18th-century sentimental movement—that movement of which the most eminent French exponent was Ronsseau. The marriage of Goethe's sister and his first acquaintance with Lavater are facts which also belong to the year 1778. Through Lavater he became much interested in the study of physiog-

In the spring of 1774 Goethe was at work on Werther, and he hastily wrote his play of Claviyo, a tragedy of faithless love, which was successful both on the stage and in book-form. It is in part founded on the Memoires of Beaumarchais. seenes of Faust were written, and Goethe dreamed of a somewhat kindred theme in the Wandering Jew; at the same time his furcical vein was not exhausted. Eminent men were added to his acquaintance; among these were Klopstock and the educational reformer Basedow. In company with Basedow and Lavater he voyaged down the Rhine; and at Pempelfort he visited Fritz Jacobi, who grew to be a friend of his heart. Among influences derived from books, the most powerful was that of Spinoza's writings. The Ethics sustained and ealined Goethe's spirit amid its various agita-tions and helped to give a unity to his life. The dramatic writings of 1775, excepting that Egmont was begun, are of secondary importance—a little play with songs named Claudine von Villa Bella, and the more eelebrated Stella (suggested by Swift's love perplexities with his Stella and Vanessa). Fernando in Goethe's play by a happy arrangement contrives to keep on terms with his pair of wives; in the author's recast of the play of many years later the hero shouts himself and Stella takes poison. Some of Goethe's most exquisite lyries belong to 1775, and are connected with his love for Lili Schönemann, orphan daughter of a weathly Frankfort banker, which led to an engagement and almost to marriage. Lili was graceful, accomplished, somewhat coquettish, and Goethe was not always a contented lover. After a time it was felt on both sides that a marriage would not Switzerland in company with the two Counts Stolberg. He would have passed into Italy but that his love for Lili drew him back. A new life, however, was in store for him; in the autumn the

GOETHE 275

young Duke of Weimar, Karl August, invited him to visit Weimar; he accepted the invitation, and on November 7, 1775, entered Weimar, not then aware that he had here found an abiding place for life.

A new period of activity begins with Goethe's entrance to Weimar. When the first days of entrance to Weimar. When the first days of boisterous entertainment had passed, and in the spring of 1776 Goethe was made a member of the privy-conneil (Geheimer Legationsrath), he set himself strennously to serve the state. By degrees much public work fell into his hands, and he acquitted himself of every duty with masterly intelligence and a rare thoroughness. In 1782 he received a patent of nohility. He superintended neceived a patent of nohility. He superintended nines, saw to public roads and huildings, regulated finance, conducted military and university affairs, numee, conducted initiary and university analis, clevated the theatrical performances, in every direction making the influence of his mind felt. Above all, he helped to form the immature character of the duke. Nor did he fail to gain true friends. The dowager-duchess from the first had eonfidence in him, and by degrees he won the esteem and affection of the young wife of Karl August. Wieland, now of mature years, declared that he was 'as full of Goethe as a dewdrap of the morning sun.' Through Goethe's influence Herder obtained a public position and a home at Weimar. But his dearest friend was Charlotte von Stein, wife of Oberstallmeister von Stein, the mother of seven children, and several years alder than Goethe. During ten years she was his conlidant, his directress, the object of his ardent and tender homage. And she knew how to hold his feelings in check, and to chasten them when he was over-violent in his passion. She kept alive the ideal in his imagination while he was occupied with the details of real affairs. Yet there was something of unhealthy strain in this love which could not hope for its highest accomplishment in marriage. During these years Goothe's mind turned away from vagne aspirings and sentimental moods to the definite and the real. He became deeply interested the natural sciences—in geology and mineralogy, botany, comparative anatomy. His discovery of the internaxillary bone in man (1784), and his theory of later date that all the parts of a plant are variations of a type which is most clearly seen in the leaf, show how his observing powers were aided by his imagination, and place him among the scientific for any work of these errect thinkey who have here tific forernners of those great thinkers who have works were begin in this period, but not many were brought to completion. Some lyrics of larger design and more elaborate form than his earlier Bat the songs show the growth of his powers. poem Die Geheimnisse, which was meant to embody his thoughts on the religions of the world, is a fragment. Two acts of his drama of *Tasso* were written (1780-81), but in prose. His noble dramatic written (1780-81), but in prose. His noble dramatic poem, Iphigenia, classical in subject, partly modern in feeling, was written in full (1779), but, like Tusso, as yet only in prose. The short play, Die Geschwister, as well as the Iphigenia, was partly inspired by his feeling for Frau von Stein. In 1777 he began his novel of Willelm Meister, designed to show how the reservoir in the steel of to show how the vague strivings of youth may be enrolled by their transition into definite and useful activity, and from time to time he made progress with it. The constant pressure of public business at length fatigued his mind, for, except a with the constant pressure of public business at length fatigued his mind, for, except a visit to Switzerland in 1779, he had few seasons of refreshment. He had long desired to visit Italy. When ten years of toil were ended he resolved to gratify that deep desire, and on September 3, 1786, he started on his journey for the south.

Goethe's residence in Italy lasted from the autumn of 1786 to June 1788. It was a most

fruitful period. Now the steadfast babits of mind acquired in the course of public business in Weimar were applied to the study of art. He lived in a blissful cahn, which was in fact the highest energy, examining the monuments of ancient art and renaissance painting, enjoying the beauty of nature, and studying the life of the people. His friends were chiefly artists—Tischbein, who painted his portrait at Rome, the Swiss Meyer, Angelica Kanffmann. He strove hard to draw, but with only moderate success. In the spring of 1787 he visited Naples and Sicily; at Palermo he made a sudden advance in his theory of botanical metamorphosis. Once again in Rome, he renewed his study of plastic art, and was inexpressibly happy and a world of beauty. The literary work of the period was chiefly that of revising or recasting earlier writings. Egmont was carried to completion (1787); the prose Iphigenia was recast in verse (1786); the scene of the Witches' Kitchen was added to Fanat; he sketched the plan and wrote a fragment of a tragedy, Nansikaa. On June 18, 1788, Goethe re-entered Weimar greatly enriched by his travel.

He was now relieved from the most irksome of his public duties, but continued to take an interest in the Ilmenan mines and in university reform at Jena. Ilis private life also underwent a great change which relieved his heart from a strain, though in an ill way. Ilis ardent idealising friendship for Charlotte von Stein was broken, and he took to his home a beautiful girl of humble rank, Christiane Vulpius, whom from the first he regarded as his wife, though the marriage ceremony was not eelehrated until October 1806. Christiane had good qualities, and was dear to Goethe, but his choice was in many respects unsuitable. In December 1789 his son August was born. Memories of Italy mingle with his love of Christiane in the Roman Elagies, poems sensuously classical in their feeling and classical in their form. In the summer of 1789 he put the last touches to the play of Tasso, which contrasts the passionate heart of the poet with the emerists the passimilate neart of the poet with the worldly wisdom of the statesman and man of affairs—two sides of Goethe's own nature. Next year in the seventh volume of his Works appeared a great portion of the first part of Faust as 'a Fragment.' This, the story of Faust's measureless strivings for truth and for joy, and the love-tragedy of Contribution belower accordibly to Contribute and in Gretchen, belongs essentially to Goethe's earlier years of the Sturm-und-Draug. The first part of Faust, completed in 1806, did not appear until 1808. Science continued to interest Goethe profoundly. His remarkable essay on the Metamorphosis of Plants was given to the printer in 1790, and when at Venice in May he suddenly struck out his muchdisensed theory of the vertebral structure of the skull. His stodies in optics, by which he hoped to disprove Newton's theory of colonis, were a great affair of his life from this time onwards, but here his conclusions, though ingeniously argued, were unsound. In 1791 Goethe was entrusted with the control of the court theatre at Weimar, and it was his aim and earnest effort to make the stage a means of true artistic culture. He was himself roused to dramatic composition, and several pieces of these years were concerned with the revolutionary movement in France. In his Venetian Epigrams he complains that the political commotion threw back the advance of quiet culture. The Grosskophta (1791) dramatises the affair of the Diamond Necklace, studies Cagliostro's arts of imposture, and represents the demoralisation of aristocratic society in France. Die Aufgeregtena dramatic fragment—in some degree holds the
balance between conflicting political parties. The
Bürgergeneral (acted 1793) is a broad jest at the German apostles of the Revolution. In Goethe's

276 GOETHE

hexameter version of the old Low German beast-epic, Reynard the Fox (printed 1794), he satirises the lusts and greeds of men under the disguise of beasts, and glances at the special vices of the Revolution days. In 1792 Goethe accompanied the duke on the disastrons campaign against the French; he heard the cannonade of Valmy, and went under fire in order to study his own sensations. Next year he was present at the siege of Mainz, and watched the French garrison march out. He has recorded his experiences and observations

in an admirable narrative.

It is possible that at this time Goethe might have grown discouraged and bitter were it not for the friendship formed with Schiller in 1794. This friendship and its fruits till the memorable years from that date to 1805, the year of Schiller's death. Together they worked in the *Horen*, a review designed to elevate the literary standard in Germany. Together in the *Xenien* (1796) they discharged their epigrams against their foes, the literary Philitians istines, Schiller's sympathy encouraged Goethe to set to work once more on Wilhelm Meisters Lehrjahre, but the later books (1796) of the novel are written on a diminished scale as compared with the earlier. It may be said more than any other work of Goethe to exhibit his criticism on life. The charming epic-idyl, Hermann und Dorothea, in which Goothe's feeling for what is best in German life and character is happily united with his artistic Hellenism, belongs to 1796-97. Then, as it were in noble rivalry with Schiller, he wrote several of his finest ballads. He had also found time to translate from the Italian the autohiography of Benvenuto Celliui. His third and last visit to Switzerland (August-Navember 1797) interrupted the flow of his creative activity, and the works undertaken after his return were of less harmy constitution. happy conception. The literary and artistic periodical, Die Propphen (1798), was ill supported, and did not live long. Next year he planned his epic, Achilleis, but it did not advance beyond one canto. His productive power slackening, he occupied himself in part with trunslating and adapting Voltaire's Mahomet (1799) and Tancride (1800), and at a somewhat later date he translated Diderot's dialogue, Le Neveu de Ramaco, from a manuscript. His drama, Die naturliche Tochter, founded on a French memoir, was designed as one part of a trilogy which should embody his mature views and feelings, but in a wholly impersonal form, on the events in France. It contains much admirable writing, but has a certain abstract air and a superficial colduess which nevented it from be-coming popular. In 1801 Goethe was serionsly ill, and painful attacks recurred from time to time. The death of Schiller in 1805 occurred while he himself was ailing, and it affected him with profound sorrow.

National disaster followed hard upon this grievous loss. In October 1806 the battle of Jena was fought, and next day Napoleon entered Weimar. Two years later, at the Congress of Erfurt, Goethe and Napoleon; and in his turn Goethe recognised in the appears a 'demonia' newer greated to rule the emperor a 'demonie' power created to rule the world. He has been blamed for lack of patriotism; but in a thoughtful kind of patriotism he was not deficient; his age and habits of mind forbade

patriotism of a passionate, demonstrative nature.
In 1808-9 was written the novel, Die Wahlverwandtschaften (Elective Affinities). It contrasts characters of self-control with characters of impulse, is disinterestedly just to both, insists on the duty of renunciation, and shows the tracic consequences of infidelity of heart in married life. Some traits of the character of the heroine Ottille are taken from Minna Herzlieb, the adopted daughter of the Jena bookseller Frommanu, a beautiful girl, who might have grown too dear to Goethe if he had not checked the feeling. A little later Goethe pub. lished his two volumes on light and colour, Z_{uv} Farbenichre; and these were speedily followed by the first part of his antobiography—Dichtung und Wahrheit (1811), the continuation of which occupied him from time to time during several subsequent years. It is a work of the deepest interest to students of Goethe's life and character, but its details of fact are not always exact, and its record of past feelings must be controlled by Goethe's letters written at the dates of which he treats.

The translation by Von Hammer of the Dirun of the Persian poet Halix interested Goethe, and was an imaginative refige from the political troubles of 1813–14. He was moved to creation of poems in a kindred spirit, and wrote (chiefly in 1814–15) the lyrical pieces published in 1819 under the title Westform a Saint-Martin's summer of friendship—that felt for Marianne von Willemer, the young wife of a Frankfort banker, and the Sulcika of the Diran. The poems are full of the summy wisdom of a bright old age, which can play without self-deception at some of the passions of youth. A grief, real and deep, came to Goethe in his sixty-seventh year in the death of his wife. The Goethe house would have been desolate, but that in the summer of 1817 his son Angust brought a bright and sweet tempered wife to dwell there, Ottilie von Pogwisch, and in due time Goethe had three grandehildren in whose happy childhood the old man found much gladness.

In his elder years Goethe still continued active. In 1821 was published Withelm Meisters Wander-jahre, a continuation of the Lehrjahre, but including many short tales that hang loosely together. Here Goethe sets forth an ideal of education, and inculcates the duty of reverence, helpful human toil, and brotherhood. The book was recast, and in this second form was finished February 1829. From time to time during more than half his life he had worked at the second part of Faust; it occupied him much during the closing years. By August 1831 it was at length complete. The hero Foust, leaving behind his first unhappy passion, advances through all forms of culture—state-eraft, science, art, war—to the final and simple wisdom of disinterested service rendered to his fellow-men. Such a spirit cannot fall into the power of Mephistopheles, the demon of negation. His soul is received into Paradise and is purified by

Goethe's interest in science and art was undiminished by age. He had grown into sympathy with medieval art partly through the influence of his young friend Sulpiz Boisserée; a universal eclecticism is, however, the characteristic of his mind in its latest development. He is best seen during these years in his Conversations with Eckermann. Sorrows came fast towards the end; his older friends, all but Knebel, disappeared one by one. In 1828 died the grand-duke; next year, the Duchess Luise. Goethe's grief was deep; but he was even more violently shaken by the loss of his son Angust, who died at Itome, October 1830. Tended by his loving daughter-in-law, honoured and reverenced by those around him, Goethe lived until the spring of 1832. On March 22 of that year, after a short illness, he died peacefully in his arm-chair. His body lies near that of Schiller in the ducal vault at Weimar.

Goethe was a man of noble bodily presence both in youth and age. His influence has affected every civilised people, and seems still on the increase. His teaching has been styled the creed of enlanc; it is rather the creed of self-development with a

view to usefulness—usefulness to be effected by activity within wise limits.

Bibliography.—I. Works (collected edd.): Hempel's ed. (indisponsable); the Weimar ed. (Bohlau), commenced in 1885; Kurschner's ed. (published by Spennam).—2. Special works: Loeper's ed. of Gedichte; Loeper's larger Faust (1879); Schroer's Fainst.—3. Letters: Weimar ed. of Works; Der junge Gorthe (Hirzel); letters to the following correspondents: Herder, Jacobi, Karl August, Fran von Stein, Knebel, Schiller, Boisserée, Zelter, Marianne von Willemer; see Strehlke's Verzeichniss (1881).—4. Conversations: Eckermann (q.v.); Biedermann's collection.—5. Life: Duntzer's Life (Macmillan, 1883), Lewes's, Vichoff's, Schaofor's, Sime's.—6. Criticism: Hettner's (the best); Rosenkranz (1856); Dintzer; W. Scherer; E. Schmidt; Loeper; Grimm; Seeley (Contemporary Review, 1884); Coupland on Faust.—7. Bibliography: Hirzel's Verzeichniss einer Goethe-Bibliothek. British Museum Catalogue, art, Goethe.—8. Miscellancous: Goethe Gesellschaft's publications. Rollett's Goethe-Bibliothes. The literature is vast, and includes thousands of titles.

Goetz von Berlichingen. See Garz.

Goffe, William, regicide, was horn about 1605, son of the rector of Staumare in Sussex, 'a very severe Purtam.' He became a major-general in the parliamentary army, sat in the House of Commons and in Cromwell's 'other house,' and was one of the judges who signed Charles's deathwarrant. In 1660, with his father-in-law, General Edward Whalley, he fied to America; and they lay in hiding round about New Haven from 1661 to 1664, when they went to Hadley, Massachusetts. There they lived for many years in seclusion; and it is there that, according to the well-known tradition, when the townsmen were called from the meeting house to repel an Indian attack, and were standing irresolute, Goffe put himself at their head and drove off the red-skins, and then disappeared as suddenly as he had come. The genuineness of the stary, however, has been questioned. Goffe appears to have died at Hartford in 1679. His papers have been printed by the Massachusetts Historical Society.

Gog and Magog, names several times used in the Bible, and given to the famous figures of giants in the Guildhall, London. Magog is spaken of by the writer of Genesis as a son of Juphet; Ezekiel speaks of Gog, prince of Magog, as a terrible ruler in the far north, united with the Persians, Armenians, and Cimmerians against I-rael; Gog and Magog in the Apocalypse appear as co-ordinate terms comprehending all future enemies of the kingdom of God. The name Magag was often applied generally to all the unknown races north of the Caucasus. The Guildhall giants are images of the last two survivors of a race of giants who inhabited Albion, descendants of wicked demons and the thirty-three infamous daughters of the Emperor Dioeletian, who, after murdering all their husbands, sailed to Albion. These giants Brute and his Trojaus finally overcame, leading the last two survivors prisoners to London, where they were kept as porters at the palace-gate. This is Caxton's aecount; another represents one of the giants as Gogmagog, and the other as a British giant who killed him, named Corinens. These giants have stood in London since the days of Henry V., and have witnessed all its history since. The old giants were burned in the great fire, and the new ones, which was 14 feet bight. which are 14 feet high, were constructed in 1708. The ancient effigies, which were made of wickerwork and pasteboard, were carried through the the present giants were in the show of 1837. For-werly other towns in England and abroad had their giants, as the Antigonus of Antwerp, 40 feet in height, and Gayant, the giant of Donay, 22 feet Gogo, a scaport of British India, situated in the peninsula of Kathiawar, and on the Gulf of Cambay, 193 miles NW. of Bombay. It has a safe anchorage during the sonth-west monsoon, with smooth water and a muddy bottom, and the townsmen are reckened the best sailors in India. Formerly a great cotton mart, its staple trade has deserted it for Bhannagar, 8 miles distant, and the place has sunk greatly in recent years. Pop. (1872) 9572; (1881) 7063.

GOGOL

Gogol, Micolai Vasilievitch, a Russian writer of decided power as a satirical humorist and delineator of conventional Russian life, and next to Pushkin and Turgénief the most popular of Russian writers, was born at the village of Sorochintsi, in the government of Poltava, 31st March 1809 or 1810. Soon after quitting the gyunasium of Niezhin, he went (in 1829) to St Petershurg, hoping to gain a living by literature. At first one disappointment followed another; however, in 1831 he became all at once famous by the publication of Evenings in a Farm near Dikanka, a collection of stories and sketches illustrating the life, enstous, beliefs, and superstitions of the people of Little Russia. Originality, the fresh heath of nature, weirdness, dreamy sadness, poetic feeling, sly humour, keen observation, realistic description—these are the most striking traits in the book. A second series followed in 1834; amongst these were Taras Bulba (Eng. trans. 1887), a prose epic having for its subject the heroic chief of the Zaporogian Cassacks, a work aglow with martial andour and vivid richness of imagination. Two other tales in the same collection, Old-World Proprietors and How the Two Irans Quarrelled (Eng. trans. in St. John's Eve., 1887), are wrought of entirely different materials. They are realistic studies of Russian provincial life, in which accurate portraiture of the monotonous days, the unitowly circumscribed self-eentred interests, the trivial details, the humalrum duties, the contemptible vanities, prejudices, and ideas of the landed gentry are set forth in the light of a satirical and bantering humour, not unmingled with genuine pathos, and in which the drawing of the characters is marked by inexorable fidelity to life and strict logical consequence. Precisely the same vein was worked, and in the same way, in various short stories illustrative of typical figures of St Petersburg life, amongst which the best are Newskii Prospect (or The Painter) and Akakia Akakievitch's New Clouk (Eng. trans. in St John's Ere).

In 1836 there came from Gogol's pen one of the best of Russian comedies, The Revising Inspector, in which the writer exposes, with uncompromising severity, and yet with irresistible fun and good-humour, the corraption, dishonesty, hypocrisy, self-satisfied ignorance, and vanity of the provincial administrative officials. In the following year (1837) he wrote his masterpiece, Dead Souls, or better Dead Sorfs (Eng. trans. 1887), a story reflecting in sombre hues the more sordid, degraded, and commonplace aspects of provincial life. Throughout this work a heavy sadness prevails, a sort of hopeless abandonment of hope, which, however, does not prevent the reader from enjoying the humour, the stern characterisation, the subtle armour-piercing satire, the melancholy pathos which are there in abundant fulluess. The ideas for both this book and the comedy were suggested to Gogol by the great Russian writer Pushkin, who was a personal friend. After unsatisfactory trials of official life, and, twice, of public teaching, including university lectures on history at St Petersburg in 1834, Gogol left his native land in 1836 to live abroad, mostly in Rome, until 1846, when he again settled in Russia. He died at Moscow, 3d March 1852. Shortly before his death he burned the second

and concluding part of *Dead Serfs*. From his boyhood he was a prey to religious pessimism—doubtless partly the consequence of his own habits. His works are frequently printed in Russia. A complete edition, with his correspondence, appeared at Moscow in 6 vols. (1856-57). See C. E. Turner's *Studies in Russian Literature* (1883).

Gogra, or GRAGRA, one of the largest affluents of the Ganges, joins that river from the north, at the town of Chapra, after a generally south-cast comes of 600 miles. It rises in the higher Himalayas, passes through Nepal, and after reaching the level land becomes the great waterway of the North-west Provinces and Oudh. Its principal tributary is the Rapti, also of commercial import-

ance.

Gohelwar', or Gohelwan, a tract of country in Bombay presidency, comprising several tributary states, and lying along the Calf of Cambay, on the eastern coast of the peninsula of Kathiawar. Gohelwar is one of the ten old territorial divisions of Kathiawar, and has an area of over 4000 sq. m., with a pop. (1881) of 98,395, mostly Hindus.

Goil, Locit, a small but bighly picture-que loch in Argyllshire, Scotland, is a branch of Loch Long (q.v.), and is 6 miles in length and less than 1 mile in breadth. Its shores are for the most part wild and rugged; but the general character of the scenery is modified by extensive natural woods of hazel. The mountains in the neighbourhood rise to the height of more than 2000 feet. Lachgoilhead is a favourite summer watering-place. It may be visited by steamers from Greenock (20 miles), and has connection by coach with Invergacy.

Goitre (Fr.), or Bronchocele, the name applied to any enlargement of the Thyroid Gland (q.v.) which is not either inflammatory or cancerons. The commonest and most interesting form of the disease is that which is endemic in certain districts, particularly in mountainous regions—e.g. among the Alps, the Himalayas (as at Darjeeling), and the Andes. In Britain it is most often met with in Derbyshire, and hence popularly called 'Derbyshire neck;' but even there it is not common. In some villages among the Alps all the inhabitants without exception are affected. Endemic goitre is often associated in the same districts and the same families with Cretinism (q.v.). Numerous theories have been advanced to account for it; it has been attributed to damp climate, snow-water, water with excess of line or of magnesia, bad feeding, bad excess of line or of magnesia, bad feeding bad entilation, and many other influences. But no one of these alleged causes is present in marked degree in all affected localities: it seems probable that various different combinations of causes are capable of producing a similar effect on the thyroid.

Sporadic eases of goitre, indistinguishable as regards the swelling from the endemic form, except that they do not attain such a large size, occur in all parts of the world. In either case, the enlargement may affect all the tissues of the gland equally, or may have its chief seat in the blood-vessels or the fibrons tissue, or may be much exaggerated by the formation of Cysts (q.v.) in the gland. In that form called Exophthalmic goitre, or Graves's disease, after its lirst describer, the thyroid enlargement is vascular and pulsating, and is associated with protrusion of the eyes, rapid action of the heart, &c., and is clearly only one symptom of a wide disturbance of the nervons

system.

In other forms of goitre the tinnour produces as a rule no obvious ill effects, except the inconvenience arising from its size, for it may be so large as to hang down upon the breast, or even to admit of heing thrown over the shoulder. In some few cases,

however, where it does not project so much forward, it is apt to press upon the windpipe, embarrassing the respiration, and may even cause death in this way.

Endemic goitre may usually be cured or checked by removal at an early stage of the malady to an maffected district and more healthy surroundings. Where this is not practicable, and in spoundic cases, iodine is the favourite remedy, both applied locally and administered internally; but no method is uniformly or certainly successful in the reduction of the culargement. In bad cases the gland has frequently been removed; but the evil results which are now known often to follow (see MYXEE-NEMA) have made surgeons, during late years, most unwilling to moderbake the operation, itself a serious one. Partial removal is not open to the same objection; nor is division of the timour in the middle line without removal. Both these proceedings sometimes give great relief, and may be followed by sbinking of the remaining gland substance. See W. Robinson, Endemic Goitre or Thyrcoccle (1888).

Golchika, a small port at the mouth of the Yenisei (q.v.).

Golconda, an extensive fortiess of the Nizam, situated on a granite ridge, 7 miles W. of Hyderabad. In its immediate neighbourhood are the mins of an ancient city, once the metropolis of the powerful kingdom of Golconda, which reached its height at the close of the 16th century, and enduced till 1687. The place itself is still strong; but it is commanded within breaching-range by the yet solid mansaleums of its former savereigns, about 600 yards distant. The fort is held by a small garrison from Hyderahad, and serves as the Nizam's treasury, and also as a state prison. Golconda is proverbially famous for its diamonds; but, in truth, they were merely cut and polished here. See Diamond.

Gold (symbol An, atomic weight 196) is perhaps the most widely and universally sought product of the earth's ernst. In the very earliest writings which have come down to us gold is mentioned as an object of men's search, and as a commodity of extreme value for purposes of adornment and as a medium of exchange. The importance which it possessed in ancient times has certainly not lessened in our day. Without the enormous supplies of gold produced at about the time when the steam-engine was being brought into practical use it is difficult to imagine how our commorce could have attained its present proportions; and but for the rush of impogrants to the gold-fields in the beginning of the second half of this century Australia might have remained a mere convict settlement, and Culifornia have become but a granary and vineyard.

On the score of geographical distribution, gold must be deemed a common metal, as common as copper, lead, or silver, and far more common than nickel, cobalt, platinum, and many others. Theorists have propounded entious rules for the accurrence of gold on certain lines and belts, which have no existence but in their own fancy. Scarcely a country but has rewarded a systematic search for gold, though some are more richly endowed than others, and discoveries are not always made with the same facility. The old prejudices, which made men associate gold only with certain localities, hindered the development of a most promising industry even within the British shores. Despite the abundant traces of ancient Roman and other workings, the gold-mines of Wales were long regarded as mythical; but recent extended exploitation has proved them to be among the richest known. This is notably the case in the Dolgelly

GOLD 279

district, where considerable gold occurs, both in alluvial gravels and in well-formed quartz veins traversing the Lower Silurian Lingula beds and the intended diabasic rocks called 'greenstone' in the Geological Survey. A peculiarity of the veins is the common association of magnesian minerals. The gold is about 20 or 21 carat fine, and often shows traces of iron sesquioxide. So long ago as 1861 some £10,000 worth of gold per annum was taken out of the Clogan mine by imperfect methods. Some samples have afforded 40 to 60 onnees per ton—a most remarkable yield. There are probably many veins still awaiting discovery.

To quote another European example, Hungary afforded the Roman conqueror fabrilous riches, and will yet produce untold wealth, when the capitalist shall condescend to look so near home. Statistics concerning the annual gold output of the world are for many reasons only approximately correct. In countries where a royalty is payable on the gold mined 'returns' are sure to be much below the actual yield; while in nneivilised lands no record is kept. Therefore it is not easy to arrive at a computation of the yearly production. But it is certain that the tendency now is toward a decline rather than the contrary. This is due to the fact that the enormous placer deposits of many regions have been to a great degree worked out; and, though vein-mining has been extended as the placers failed, the extraction of gold from the vein-stuff is a slower and more costly operation, requiring a larger expenditure of capital and employing more labour. Thus, the great yields obtained between 1850 and 1870, reaching 30 to 40 million pounds sterling annually, were the result of extensive placer operations that have now ceased, and recent figures would show not more than 15 to 20 millions as the yearly pro-duct. A calculation was made in 1881 that the total gold extracted up to that date had been over 10,000 tons, with a value of about 1500 millions sterling. California, to the end of 1888, was reckoned to have afforded over 200 million pounds' worth, and this figure is exceeded by the Australian colony of Victoria. In round numbers, the present yield of the chief countries furnishing gold is computed as follows: United States, 64 millions; Australasia, 54; Russia, 54 (probably a very low esti-mate, and one that will be much increased when the auriferous veins come to be worked); South American States, 1½; other countries, 1½ (of which Hungary contributes ¼ million); total, 20½ millions sterling. For the appreciation of gold, see Bimetallism.

Geologically, as well as geographically, gold is widely dispersed. The early geologists propounded theories concerning the age of gold deposits which did as much to retard the development of gold-mining as to promote it; for while they indicated certain formations as being probably anriferous, and drew attention to them, they, on very slight grounds, pronounced other formations to be positively non-auriferous, and thus dissuaded prospectors from studying beds which almost accidentally have been found to be rich in gold over enormous areas and to great depths. In the light of modern explorations it would be unsafe to say that any formation must a priori be barren of gold. On the contrary, its presence may be always anticipated, if not in workably paying quantity, until its absence

has been proved.

The origin of gold-bearing mineral veins is inseparably connected with that vexed question, the origin of mineral veins generally (see ORE-DEFOSITS). Suffice it to say here in brief that, while one class of geologists ascribe it exclusively to igneous agencies, another class as stoutly defend a theory of aqueons solution. It is not

mireasonable to suppose that the truth lies between the two parties—that some deposits are due to platonic and others to aqueous origin. Gold has been found and worked in rocks of undoubted igneons origin and of primary age. It has also been found in the interstices of a lava ejected within historic times. On the other hand, its presence has been proved in the water of the seas surrounding the British Islands, and in the deposit formed by hot springs now in activity. Speaking broadly, a gold deposit may be of any geological age, from that of the oldest rocks to that of rocks still in course of formation. But hitherto its stall in course of formation. But hitherto its presence in notable quantity has been chiefly proved in connection with certain formations. Taking the sedimentary rocks in chronological order, the chief autiferous regions may be classified as follows: Metamorphic rocks afford the chief gold-supplies of Nevada, South Dakota, Siberia, Hayti, India, Japan, and New Caledonia. Lanren-tian rocks are arriferous in West Africa, Brazil, and Canada; Cambrian in Nova Scotia and Brazil. Silurian is the great gold formation of Anstralia, and figures in New Zealand, French Gniana, and the Andes. Devonian age is ascribed to some of the gold of Cornwall, Siberia, and Anstralia. The coal-measures of Queensland, partly of Carboniferons and partly of Pennian age, enclose the Gympie goldield; and some of the gold leds of New Zealand, New Branswick, Nova Scotia, New Mexico, Ladakh, India, New Sonth Wales, and Somersetshire are of Carboniferons age. The Jurassic formation has not proved of much importance, but affords some gold in Europe and Juriase formation has not proved of finich importance, but affords some gold in Enrope and Mexico. Triassic rocks are abundantly gold-yielding in California and Mexico. Chalk is probably as little associated with gold in men's minds as is coal, yet the Cretaceous rocks of California, Dakota, New Zealand, Queensland, Afghanistan, and Hungary afford large supplies of the precious metal. The Tertiary gravels of the western states of America and of Australasia have been the source of the engagency yields of placer been the source of the enormous yields of placer gold from those countries, and embrace thousands of square miles of Miocene, Pliocene, and Postpliocene beds resulting from the crosson and disintegration of the gold-carrying veins of the older rocks.

Of the igneous rocks with which gold is associated, diorites hold a foremost place in Hungary, Nevada, New South Wales, Victoria, Queensland, South America, Italy, the Urals, India, Turkestan, New Guinea, and New Zealand. Granite, syenite, and gneiss are amiferous in Colorado, Virginia, Carolina, South America, Canada, Australia, Turkestan, Asia Minor, Hungary, and Siberia. Porphyritic rocks carry some of the gold of Queensland, Victoria, New Zealand, Borneo, and South America. The scrpentines of Queensland and Newfoundland have yielded gold; while the trachytes of New Zealand, Dakota, Mexico, Queensland, and Hungary are important gold-carriers.

By far the most common matrix of vein gold is quartz or silica, but it is not the only one. To pass by the metals and metallic ores with which gold is found (because it will be more convenient to deal with them when speaking of the treatment necessary to release the gold), there are several other minerals which serve as an envelope for the precions metal. Chief among them is linne. Some of the best mines of New South Wales are in calcarcons veius. Sundry gold reefs in Queensland, New South Wales, Victoria, and Bohemia are full of calcite. Dolomite occurs in Californian and Manitoban mines; and apatite, aragonite, gypsun, selenite, and crystalline limestone have all proved auriferons, while in some cases neighbouring quartz

GOLD 280

has been barren. Felspar in Colorado and felsite magnesian slate in Newfoundland earry gold.

magnesian state in Newfoundiand carry gold.

The physical conditions under which gold occurs are extremely variable. Popularly speaking, the most familiar form is the 'nugget,' or shapeless mass of appreciable size. These, however, constitute in the aggregate but a small proportion of the gold yielded by any field, and were much more common in the early days of placer-mining in California and Australia than they are now. The largest ever found, the Welcome Nugget, discovered in 1858 at Bakery Hill, Ballanat, weighed 2217 oz. 16 dwt., and sold for £10,500, whilst not a few have exceeded 1000 ounces. The origin of these large unggets has been a subject for discussion. Like all placer or alluvial gold, they have been in part at least derived from the anriferous veins the tracks whose disintegration furnished the material forming the gravel beds in which the nuggets are found. But no mass of gold has ever been discovered in a vein equal in size to many of the nuggets meathed from the gravels. Hence has arisen a theory that in the cause of ages nuggots have 'grown' in the gravels—that is to say, nodular fragments of gold have gradually accumulated and attached to themselves smaller fragments with which they came in contact, and perlaps helped to cause the re-deposition of gold held in suspension or solution by mineral waters which have percolated through the superincumbent mass of gravol. Gold nuggets have been artificially formed in the laboratory by decomposing solutions of the chloride or sulphido. In the earliest experior the chlorate or sulpindo. In the earnest experiments organic matter was added to effect the decomposition—e.g. a piece of wood; but it has been found that the presence of organic matter is by no means necessary, and that fragments of pyrites and other mineral bodies common in auriferous formations are very suitable nuclei on which the male accomplete. which the gold accumulates in a concretionary state, resembling natural nuggets. The more common form of alluvial gold is as

The more common form of alluvial gold is as grains, or scales, or dust, varying in size from that of ordinary ganpowder to a minuteness that is invisible to the naked eye. Sometimes indeed the particles are so small that they are known as 'paint' gold, forming a scarcely perceptible coating on fragments of rock. When the gold is very line or in very thin scales much of it is lost in the ordinary pracesses for treating gravels, by reason of the fact that it will actually float on water for a considerable distance.

considerable distance.

Vein-gold is often crystalline in structure, the elementary form being cubical. In some localities too, notably in Hungary, it assumes most beautiful leaf-like forms, such fetching a high price among collectors for mineral cabinets. In the cres of other metals, such as pyrites, galena, &c., gold very commonly occurs as an accessory, but cannot be detected except by assay. Whether, as in all other cases, the gold exists in the native state in It is never found such ores is open to some doubt. absolutely pure; some silver is always present as an alloy, and occasionally also bismuth, lead, and tellurium.

From what has been already said it will be evident that gold-mining must be an industry presenting several distinct phases. These may be classed as alluvial mining, vein-mining, and the treatment of surfagure area.

treatment of anriferous ores

In alluvial mining natural agencies, such as frost, rain, &c., have, in the course of centuries, performed the ardnons tasks of breaking up the matrix which held the gold, and washing away much of the valueless material, leaving the gold concentrated into a limited area by virtue of its great specific gravity. Hence it is never safe to assume that the portion of the veins remaining as such will yield

anything like so great an equivalent of gold as the alluvials formed from the portion which has been disintegrated. As water has been the chief (but not the only) agent in distributing the gold and gravel constituting alluvial diggings or placers, the banks and beds of running streams in the neighbourhood of anriferous veins are likely spots for the prospector, who finds in the flowing water of the prospec-tor, who finds in the flowing water of the stream the means of separating the heavy grains of gold from the much lighter particles of rock, sand, and mnd. Often the brook is made to yield the gold it transports by the simple expedient of placing in it obstacles which will arrest the gold without obstructing the lighter matters. Jasou's golden fleece was probably a sheep-kin which had been pegged down in the current of the Phasis till a quantity of down in the chirch of the Phasis the a quantity of gald grains had become entaugled among the wool. To this day the same practice is followed with ox-hides in Brazil, and with sheep-kins in Ladakh, Savay, and Hungary. This may be deemed the simplest form of 'alluvial mining.' If the gald deposited in holes and behind bars in the bed of the deplated in lores and beam bases in the beat of the stream is to be recovered, greater preparations are needed. Either the river-bed must be dredged by floating dredgers, worked by the stream or otherwise; or the gravel must be dug out for washing while the bed is left dry in hot weather; or the river must be diverted into another channel (natural or artificial) whilst its bed is being stripped. first-named method is best adapted to large volumes of water, but probably is least productive of gold, passing over much that is buried in crevices in the solid hed-rack. The second plan is applicable only to small streams, and entails much labour. third is most efficient, but very liable to serious interference by floods, which entail a heavy loss of plant.

In searching for placers it is necessary to hear in mind that the watercourses of the country have not always flowed in the channels they now occupy, During the long periods of geological time many and vast changes have taken place in the contour of the earth's surface. Hence it is not an uncommon circumstance to find beds of anriferous gravel occupying the summits of hills, which must, at the time the deposit was made, have represented the course of a stream. In the same way the remains of riverino accumulations are found forming 'terraces' or 'bonches' on the flanks of hills. Lacustrine bods may similarly occur at altitudes for above the reach of any existing stream, having been

the work of rivers long since passed away, So far, account has been taken only of gravels lying practically within view. But in many instances an enormously thick covering of more recently distributed material, resulting from the demidation of non-anriferous racks, hides the earlier gravel, which is auriferons. Such a phenomenon was not suspected until the first instance of the kind was discovered by some miners who, in following a gravel patch formed by an existing water-course, were led to burrow into the side of the adjacent hill, nuder which the golden ground continued to be found, and then men realised that the modern stream was only redistributing the rich accumulation made by a river belonging to a system that had ceased to exist. As prospecting extended and became a subject for scientific study, such instances rapidly unltiplied, and to these 'deep leads' or 'dead rivers' is due the bulk of the placer gold found in Australasia and California. Generally the watersheds in the extinct system run at right angles to the present, so that operations often extend under modern hill-ranges. A more surprising discovery was that many of the ancient river-beds had been filled up by flows of volcanic rock, and in not a few cases several streams of molten matter had at varying intervals displaced

GOLD 281

the river, which afterwards resumed its course and its habits, so that the extraordinary feature is encountered of several superposed beds of anriferons gravel alternating with layers of lava.

enconnected of several superposed seas of anneaons gravel alternating with layers of lava. Another form of alluvial digging ocenrs in Western America and New Zealand, where the sea washes up auriferous sands. These are known as 'ocean placers' or 'beach diggings,' and are of

minor importance.

Whilst most placers have been formed by flowing water, some owe their origin to the action of ice, and are really glacial moraines. Others are attributed to the effects of repeated frost and thaw in decomposing the rocks and causing rearrangement of the component parts. Yet another class of deposits is supposed to have been accumulated by an outpouring of volcanic mud. And, finally, experts declare that some of the rich bunket beds of the Transvaal became auriferous by the infiltration of water containing a minute proportion of gold in solution.

In all cases the recovery of alluvial gold is in

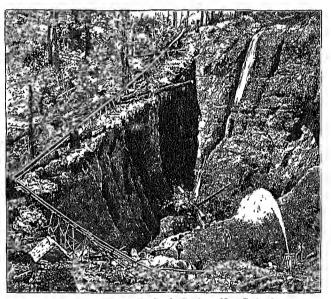
In all cases the recovery of alluvial gold is in principle remarkably simple. It depends on the fact that the gold is about seven times as heavy,

fact that the gold is about seven bulk for bulk, as the material forming the mass of the deposit. The medium for effecting the separation is water in motion. The apparatus in which it is applied may be a 'pan,' a 'crudle,' or a 'tom,' for operations on a very small scale, or a 'sluice,' which may be a paved ditch or a wooden 'flume' of great length, for large operations. The modus operandi is the same in all: flowing water removes the earthy matters, while obstructions of various kinds arrest the metal. As a rule it is more advantageous to conduct the water to the material than to earry the material to water. In many cases a stream of water, conveyed by means of pipes, and acting under the influence of considerable pressure, is utilised for removing as well as washing the deposit. This method is known as 'piping' or 'hydranlieing' in America, where it has been chiefly developed, but is now forbidden in many localitics, hecause the enormous masses of carth washed through the sluices have silted

ap rivers and harbours, and caused immense loss to the agricultural interest by burying the rich riverside lands under a deposit that will be sterile for many years to come. The plan permits of very economical working in large quantities, but is extremely wasteful of gold. The water-supply is of paramount importance, and has led to the construction of reservoirs and conduits, at very heavy cost, which in many places will have a permanent value long after gold-sluicing has ceased. These large water-supply works are often in the hands of distinct parties from the miners, the latter purchasing the water they use. To give an example of the results attained in alluvial mining, it may be mentioned that in a three-months' working in one Victorian district in 1888 over 33,500 tons of wash-dirt were treated for an average yield of 18½ grains of gold per ton, or say, one part in 700,000. Where water cannot be obtained recourse is had to a faming or winnowing process for separating the gold from the sand, which, however, is less efficacious.

Vein-mining for gold differs but little from work-

ing any other kind of metalliferous lode. When the vein-staff has been raised it is reduced to a pulverulent condition, to liberate the gold from the gaugne. In some cases roasting is first resorted to. This causes friability, and facilitates the subsequent comminution. When the gold is in a very fine state, too, it helps it to agglomerate. But if any pyrites is present the effect is most detrimental, the gold becoming coated with a film of sulphur or a glaxing of iron oxide. The powdering of the veinstaff is usually performed in stamp batteries, which consist of a number of falling hammers. While simple in principle, the apparatus is complicated in its working parts, and is probably destined to give way to the improved forms of crushing-rolls and centrifugal roller mills, which are less costly, simpler, more efficient, and do not flatten the gold particles so unch. One of the most effective is that by Jordan. When the vein-stuff has been reduced to powder, it is akin to alluvial wash-dirt, and demands the same or similar contrivances for arresting the liberated gold and releasing the tailings—i.e. merenry troughs, amalgamated plates, blanket strakes, &c.; but, in addition, provision is



Hydraulic Mining, Devil's Creck, Reefton, New Zealand.

made for catching the other metalliferous constituents, such as pyrites, which almost always carry a valuable percentage of gold. These pyrites or 'sulphurets' are cleansed by concentration in various kinds of apparatus, all depending on the greater specific gravity of the portion sought to be saved.

specific gravity of the portion sought to be saved.

Of the metals and minerals with which gold is found intimately associated in nature are the following: antimony, arsenic, bismuth, cobalt, copper, iridium, iron, lead, manganese, nickel, osminn, palladinm, platinum, selenium, silver, tellurium, tungsten, vanadium, and zine, often as an alloy in the case of palladium, platinum, selenium, silver (always), and tellurium. The methods of separation vary with the nature of the ore and the conditions of the locality. In the case of sulphides of some of the base metals the sulphur can be exidised by burning in suitable kilns, so as to afford sulphurous or sulphuric acid, leaving the gold and other metals in the 'cinders,' whence they can be recovered by solution. Where the base metal is volatile it may be obtained by condensing the funes. To get rid of the sulphur and arsenic in the ore (with or without

utilising them) is generally the first step, and is most commonly performed in some kind of fur-nace. This done, the 'sweet' cinders are subjected to the action of chlorine, which forms a soluble chloride with the gold, easily separable by washing with water. There are many ways of effecting this, some being the subjects of patent rights, for which very large sums have been injudiciously paid by the British public. Sometimes the washing and chlorination are combined in one operation by placing salt in the furnace; but in many cases this less led to enormous loss of gold by volatilisation. This question is too complicated for discussion here, but may be studied in Lock's Practical Gold

Mining (1889), which contains also a complete libliography of the subject.

The most important physical and chemical properties of gold are as follow: In malleability it stands first of the metals, and its ductility is remarkable, hence it may be beaten into leaves not exceeding 25,5000 of an inch thick, and quite translucent, and I grain in weight may be made to cover 56 square inches of surface, or drawn into a wire 500 feet long. Its specific gravity is about 19.2 when fused, or 19.4 when hammeted, being less than platinum and indium. Its colour and lustre in the concrete form are sufficiently familiar, but when thrown down from solution in a minute state of division it appears brown, and seen by transmitted light while held in suspension the atoms exhibit a purple tint, as also when it is volatilised. In softness it approaches lead, and in tenacity it ranks below iron, platimum, copper, and tonacity it ranks below iron, platimun, copper, and silver; yet a wire only 1855 of an inch thick will support 150 lb. It is an excellent conductor of heat and electricity. Its fusing-point is 2016' by Daniell's pyrometer. When pure it is difficult of volatilisation, requiring the intense heat of an oxyluderocan flame, or a strong electric current. It hydrogen flame, or a strong electric current. It was long thought to be practically non-volatile in the heat of an ordinary furnace; but, as has been already stated, under certain conditions it is very

readily vaporised, and immense losses have been

incurred in consequence.

Having but little affinity for oxygen, gold is not affected by exposure to the air; but two oxides may be formed artificially—the protoxide, AuO, may be formed arthicently—the protoxide, AnO, by decomposing gold protochloride with a potassic solution, and a teroxide, AnO,, or auric acid by boiling terchloride with magnesia or carbonate of soda. Silica, on the other hand, attacks it with avidity, forming a silicate which is extremely insoluble in water, but decomposes with age. Sulphyretted hydragen combines with gold at ordinary temperatures to form a sulphide, which is soluble in alkaline sulphides, and slightly so in pure water. A bisulphide is obtained by passing sulphuretted hydrogen through a cold solution of terchloride; and a double sulphide of gold and potash is produced by heating gold in a very fine state with sulphur and carbonate of potash, constituting the porcelnin gilding known as 'Burgos Instre.' is affected by solenic acid, and is dissolved by iodine and by hyposulphite of soda. It is not affected by alkalies, nor by hydrochloric, nitric, or sulphuric acid alone; but is rapidly dissolved by aqua regia (nitro-hydrochloric acid), and by any substance liberating chlorine. Two chlorides are known: a proto salt, AuCl, and a ter salt, Au Cl., the latter forming reddish-yellow solutions with water, ether, and alcohol. Gold is volatile in the presence of chlorine at all temperatures between boiling water and white heat, and cannot be recovered by condensation, but only by decomposition of the volatile eldoride. Gold chloride and sulphide remain in solution in presence of excess of sulphiretted hydrogen and an alkaline carbonate the gold gradually depositing as the carbonic acid

Gold solutions are precipitated by oxalic. еѕспреь. tartarie, citrie, and other organic acids; also by wood, bark, charcoal, and other organic matters, the gold being thrown down in a pulverulent form, and recoverable by burning. Gold is also precipitated by iron sulphate, and by sulphur dioxide in the presence of water, as a metallic powder; further, by copper sulphide, which, when converted into sulphate, yields the gold in a metallic state highly favourable for collecting. Mineral sulphides (e.g. pyrites) decompose gold solutions, and collect the gold in a coherent form; they similarly attack gold chloride volatilised in the roasting formace, and absorb it.

roasting birmace, and absorb it.

(dold forms many alloys with other metals. Those occurring in nature have been aheady mentioned; their importance is very small industrially. But another alloy, that with copper, is of prominent value, being the basis of gold coinages. The admixture of copper lessons the density, but increases the hardness and fusibility of the alloy, rendering it better suited to the purpose. The proportion of copper is standard. purpose. The proportion of copper in standard gold coin varies, being 8:33 per cent. in Great Britain, and 10 per cent. in France and the United Britain, and 10 per cent. in France and the United States. In Great Britain, since 1816, gold is the only legal tender for sums above forty shiflings; in many after countries gold coin is latterly coming into extended use where formerly silver only was employed. The market price of gold bullion varies with its purity: pure gold (24 caint) is worth £4, 4s. 113d, per oz., while 22 carat fetches only £3, 17s. 104d, and 20 carat £3, 10s. 93d. (see BIMETALLISM, CURRENCY, MONEY). The readiness with which gold alloys with mercury is very largely utilised in collecting the scattered fragments of the precious metal, in treating amiferous sands and rocks, and, on a smaller scale, in gilding. The conditions governing perfect amalgamation of crude gold demand most minute attention from the miner. The functial alloys of gold made by jewellors are chiefly:

See ALLOYS, AMALGAM; also ASSAY, see Alijoys, Amanaam; also Assay, Metal-Lurgy, Minna. Gold may and often does cost more to produce than it is worth. In Victoria, where it is economically worked, the total average of gold produced per head of all engaged in gold-mining was in 1887 only 296, 17s. 2d.; so that the gold unner's wage may safely be set down other kinds of work. Among notable gold discoveries are those in California in 1848; Australia (New South Wales and Victoria) in 1851; British Columbia, 1858; New Zenhand and Nova Scotia in 1861; South Africa (Transvaal) and Sutherlandshire, 1868; West Anstralia, 1870; South Australia,

1886; Wales, 1887.

Fulminating gold is an extremely explosive green powder made from teroxide of gold and caustic

anunonia.

Purple of Cussius is a gold compound, described at Purpus

Mosaic gold is a tin salt (see Tin).

Gold, Field of the Cloth of, a name given, because of the extravagant magnificence of the Calais, where Henry VIII. met Francis I. of France, 7-25th June 1520. See Francis I., Henry VIII.

Goldau, formerly a small town of Switzerland, in the canton of Schwyz, is memorable for its destruction by a stupendons landslip, 2d September 1806. In a few minutes not only Goldan but the

neighbouring villages of Busingen, Rothen, and Lowerz were overwhelmed, and a part of the Lake of Lowerz was filled up, by the fall of the upper slope of Mount Rossberg. The valley is now a wild rocky waste, overgrown with grass and moss. The village of Nen-Goldan, on the line of the Rigi railway, consists of lmt a few houses.

Gold-beater's Skin, a very thin but tough membrane prepared from the external coat of the encum-a part of the great intestine-of the ox. It is drawn off in lengths of 25 inches or more from the other coats, immersed in a weak solution of potash, and scraped with a blunt knife upon a board. After a soaking in water, two of these pieces are stretched upon a frame, dried, and then separated by a knife. Each ship is again fixed with glue to a frame, and washed over with a solu-tion of alum. When dry it is next coated with fish-glue, and afterwards with white of egg. fish-glue, and afterwards with white of egg. The piece of membrane is then cut into squates of 5 or 53 inches. A gold-beater's mould contains from 900 to 950 of these squares, and to furnish this nearly 400 oxen are required. Besides its application in gold-beating, this fine membrane is used in the dressing of slight wounds.

Gold-beating is a very ancient art, having been practised from a remoto period among oriental nations. Cilding with leaf-gold is found on the collins of Egyptian mammies, on some Greek pattery vases of as early a date as the 4th or 5th century B.C., and on portions of the palaces of ancient Rome. Beckmann states that the German monk Theophilms, who appears to have lived at least as early as the 12th century, describes the process nearly as it is at present, the gold having been beaten between parehment, which is practically the same as the modern method. Formerly the gold-heater's art was largely practised in Florence, but in that city the production of fine gold-leaf has greatly diminished during the latter half of the 19th century through French and German competition, the latter country especially now making large quantities of an inferior gold-leaf. Gold-beating is practised in most of the large towns of the United Kingdom, but London is its chief centre.

According to the shade of colour required gold is alloyed for beating either with silver or copper or The proportion of copper rarely exceeds one-twentieth part that of the gold, but the quantity of silver in the alloy is sometimes much larger. The ingot being prepared, it is rolled ant into a ribbon 1½ inches wide, a 10-feet length of which weighs an onnce. This length of ribbon is then annealed and cut into about 75 pieces of annealed and cut into about 75 pieces of equal weight. Formerly these were placed be-tween leaves of vellum, but a tough kind of paper is now used with a leaf of yellum at intervals through the packet, which is from 3½ to 4 inches square. The pile of bits of gold ribbon thus interleaved is called a 'cutch,' and this, having been placed upon a thick block of mable about 9 inches square, resting on a strong bench, is beaten with a hammer weighing from 15 to 17 lb., till the pieces of gold extend to the size of the squares of the paper. The hammer rebounds by the elasticity of the vellum, which saves or at least lessens the labour of lifting it. Each square of gold in the cutch is now taken ont, cut into four pieces, and placed between leaves of Gold-beater's Skin (q.v.). This pucket, termed a 'shoder,' is beaten with a 9-lb. hammer for about two hours, or six times as long as in the first or outer bright. From the finel heating the first or enteh beating. For the final leating the gold leaves from the shoder are again divided into four, and each piece placed between leaves of fine gold-beater's skin, about 950 of which form a packet termed a 'mould.' After four hours' heating with a 7-lb, hammer the gold-leaf in the monld

is of the thickness usually sold, which averages the 282,000th part of an inch. Each skin of the mould is rubbed over with calcined gypsum to prevent the gold adhering to it. One grain of gold in the form of gold-leaf of the ordinary thickness used in gilding measures about 56 square inches, but it can be beaten out to the extent of 75 square inches. A grain of silver can be beaten out to a still greater extent, but the leaf would really be thicker, since this metal has not nearly the density of gold.

An alloy consisting of 37 grains of gold, 2 of silver, and 1 of copper makes a leaf with a deep yellow colour. A compound containing 4 grains of gold to 1 of silver gives a pale-yellow leaf, but as the proportion of silver is lessened it becomes deeper in the yellow. Seen by transmitted light gold-leaf when only slightly alloyed appears green, hat if it contains a large proportion of silver its colour is violet. For external gilding, leaf made from pure gold is the best, as it does not tarnish by atmospheric influences; but it is not so convenient for ordinary jumposes.

Goldberg, a town of Prussian Silesia, on the Katzbach, 13 miles by rail WSW. of Liegnitz. It nwes both origin and name to its former rich goldmines; suffered much from Mongols and Hussites, the Thirty Years' War, the campaign of 1813, and finally from great fires (1863-74); and now has manufactures of broadcloth, flamel, &c. Pop. 6736.

Gold Coast, a district of Guinea, on the west coast of Africa, with an area of about 15,000 square miles, or, including the protected states, 29,400 square miles, and (1889) an estimated population of 1,426,450. It extends between 5° W. and 2° E. long, having the Slave Coast on the east and the Ivory Coast on the west, lins a coast-line of some 350 miles, and reaches back inland to the conlines of Ashanti and Dahomey, 50 miles from the Gulf of Guinea. Its shores are low and swampy, and very difficult of approach owing to the heavy surf which constantly beats upon them. From the lagoons of the coast the country lises grainally towards the interior, and is furrowed by numerous small streams. The principal products and exports of the district are palm kernels and children when the control of the district are palm kernels and the control of the district are palm kernels and the control of the district and the control of the coast of the district and the control of the coast o oil, imlia-rubber, gold-dust, ivory, and monkey skins; but cocoa-iuts, copra, coffee, Calabar beans, corn, ground-nuts, Guinea grains, ginger, camwaod, gum capal, tobacco, and porcupine quills are also praduced. Gold is mined by Europeaus. The exports and imports each reach an annual value of about £360,000 or £370,000. The climate is very unhealthy, the mean temperature 82° F. Except for the French settlement of Assini, the whole of the Gold Coast belongs to Great Britain, and is administered by a governor residing at Christianshorg. The inhabitants are pure negroes, who are in most cases governed by their own chiefs. The largest town is Acera.

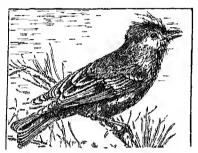
Golden Age. See AGE.

Golden Beetle, the name popularly given to many members of a genus of coleopterons insects, Chrysomela, and of a sub-family, Chrysomeline, belonging to the tetramerous section of the order. The body is generally short and convex, the anapproximation of the coleopterons of the coleopterons of the coleopterons. tenne are simple and wide apart at the base; some of the species are destitute of wings. None are of large size, but many are distinguished by their metallic splendour of colour. The finest species are tropical, but some are found in Britain—e.g. the golden *C. cercalis* with purple stripes found on Snowdon, and the brassy-green *C. polita* and *C. staphylea* commonly found on nettles in spring. In north temperate countries some of the adults of the autuninal brood sleep through the winter, awakening in spring to reproductive functions. Some of

them, in the larval state, commit lavages on the produce of the held and garden

Golden Bull (Lat bulla aurea), so ealled from the gold case in which the seal attached to it was enclosed, was an edict issued by the Emperor Charles IV in 1356, mainly for the purpose of settling the law of imperial elections See GER

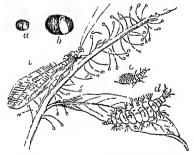
Golden-crested Wren (Regulus cristatus), a very beautiful bind of the family Sylvida, the smallest of Butish binds. Its entire length is scarcely three nucles and a half. Notwithstand ing its English name, it is not really a wien, but this name continues in popular use rather than Regulis and Kinglet, which have been proposed instead. The golden crested wien is greenish yellow on the upper parts, the checks and throat grayish white, the crown feathers elengated, and forming a bright yellow crest. In its highes it is intermediate between the warblers and the tits



Golden crested Wien (Regulus cristatus)

It particularly affects in woods lt is not un common in Britain, from the most southern to the most northern parts, but many come also from more northern countries to spend the winter, and it is on record that, in October 1822, thousands were driven on the coast of Northumberland and Dulham by a severe gale from the north east. The nest of this bird is suspended from the outermost twigs of a branch of in, some of them being inter woven with it -Another species (R ignicapillus), with more vividly red crest, is sometimes found in Butain, and species are found in Asia and North America

Golden-eye Fly (Cho ysopa perla), also called Lacewing Fly, a neuropterons muset, common in Britain, pale green, with long thread like antenna, long gauze like wings, and brilliant golden eyes



Golden eye Fly (Chrysopa perla). a, eccoon, b, the same magnified, c, larra, d, the same magnified and freed from adhering substances, c, perfect insect, on a branch to which its eggs are attached

Its flight is feeble The length, from the tip of the antennæ to the tip of the wings, is almost an meh

and a half, but the insect without wings and antenna is not more than one third of this. The female attaches her eggs, in groups of 12 or 16, by long han like stalks, to leaves or twiss, where they have been unstaken for fungi. The larve are have been instaken for ining. The late t are ferocrous looking, little animals, rough with long hars, to which particles of hehen or bank become attached, they are called aphies hours, and are very useful in the destruction of aphieles, on which they feed The pupp is enclosed in a white silken cocon, from which the fly is liberated by a lid The general facts above stated me also time of another very common species (Ch. vulgaris)—a delicate green insect, with a body about half an meh long The species of Chrysopa cent a very disagreeable odom. The nearly alloed genrs Heme tohus is also abundantly represented in Britain and elsewhere

Golden Fleece (Fr torson d'or), in Greek tradition, the fleece of the rain Chrysomallus, the expedition of the Argmants (q v). The Golden I leave has given its name to a calchated order of kinghthood in Austria and Spain, founded by Philip III, Duke of Binguidy and the Nether hands, at Bruges on the 10th January 1429, on the occasion of his marriage with Isubella, daughter of King John 1 of Portugal This order was instituted for the protection of the chirch, and the fleece was probably assumed for its emblem as much from being the material of the staple main facture of the Low Countries as from its connec facture of the Low Countries as from its comection with heroic times. The number of the knights was thirty-one, and they themselves filled up remeats by vote. This continued till 1559, when Philip II of Spain held the last (the 23d) chapter of the order in the cathedral of Chent; and subsequently Philip obtained from tacgory XIII per mission to monutate the knights limiself. After the death of the last Hapsburg king of Spain in 1700, the Emperor Charles VI land claim to the sole headship of the order in virtue of his possession of the Netherlands, and, taking with him the archives of the order, ecclohated its in angulation with great magnificance of Vronna in angulation with great magnificence at Vionna in 1713. Philip V of Spain contested the claim of Charles, and the disjinte, several times renewed, was at last tarity adjusted by

the introduction of the order in both countries. The in agma are a golden fleece (a sheepskin with the head and feet attached) hanging from a gold and blue enamelled finit stone emitting llames, and borne in its turn by a ray of hie On the emmelled obverse is inscribed Pretrum luborum non title The decoration was originally suspended from a chain of alternate flints and rays, for which Charles V. allowed a red ribbon to be anb stituted, and the chain is now won only by the Grand master Order of the Golden The Spanish decoration differs Fleece



slightly from the Austrian
The costame consists of a long tobe of deep red velvet, had with white talletus, and a long montlo of purple velvet limed with white satin, and nelly timined with embroidery containing his stones and steels emitting flames and sparks. On the hom, which is of white satin, is embrodered in gold, Je Pay empres There is also a cap of pupile velvet ombroidered in gold, with a hood, and the shoes and stockings are red. See Reffenberg, Historie de l'Ordre de Torson d'Or (1830); and Zoller, Der Orden com Goldenen Vlus (1879).

Golden Gate, a channel 2 miles wide, forming the entrance to the magnificent Bay of San Frui ersen, and washing the northern shore of the penni eser, and which san Francisco is huilt It is de fended by Fort Point, at the northwestern extremity of the peninsula, and by a fort on Aleatra Island, inside the entrance

Golden Horde. See KIPICHAK

Golden Horn. See Constantinople

Golden Legend (Lat Amea Legenda), a cele brated medical collection of lives of the greater saints, which passed through more than a hundred editions, and was iendered from Latin into most of the western languages. It is the work of Jacobns de Voragine (1230-98), a Dominican, who was Archlishop of Genoa for his last six years, and wrote many works, among them the Chromeon Januarse, a listory of Genoa from mythical down to contemporary times. The Golden Legend has 182 chapters, and is divided into live sections, emissionaling to as many divisions of the year It contains many purille legends and contemporary minacles vonchsafed especially to Dominicans. A translation was made by William Caxton, and published in 1483. A good edition is that by Grasse (Diesden, 1846). editions, and was rendered from Latin into most of Grasse (Dresden, 1846)

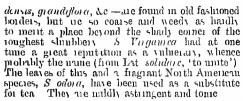
Golden Number for any year is the number of that year in the Metome Cycle (q v), and, as this cycle embreses inneteen years the golden inimities, range from one to inneteen. The cycle of the Cheek astronomer Meton (432 BC) came into general use soon after its discovery, and the number of each year in the Metonic cycle was marked m golden colours in the Roman and Alexandran calendars. Hence the origin of the mane. Since the introduction of the Caegorian calendar the point from which the golden numbers are reckoned.

> same day (1st of Janu ary) every mueteenth year from that time, we obtain the following rule for hiding the golden munber for any partienlar year 'Add one to the number of years, and divide by nineteen the quotient gives the number of cycles and the remain des gives the golden number for that your, and if there be no re mainder, then ninetren is the golden number, and that year is the last of the cycle? The golden number is used for determining the Epact (q v) and the time for holding Laster (r p)

Golden Oriole. See Orioi L

Golden-rod (Solidago), a genus of Composita, closely allied to Aster Only the common S I'm quinca is British, a few

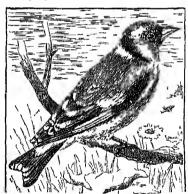
others are Emopean, but most (more than 100) belong to North America, where their bright coloning lighters up the beautiful autumual scenery some—e g S cana



Golden Rose, a rose formed of wrought gold, and blessed with much solemnity by the pope in per son on the fourth Sunday in Lent, which is called, from the first word in the service for the festival, 'Lectare Sunday' The rose is anointed with balsain, funngated with incense, spinikled with misk, and is then left upon the altar until the conclusion of the mass It is usually presented to some Catholic prince, whom the pope desires especially to honom, with an appropriate form of words. The practice seems to have originated in the 13th century Amongst recipients have been Heman VIII (three tunes), Queen Mary of England, Maria Theresa, Napoleon III, and Isabella II of Spain

Gold-eye, or Moon tir (Hyodon tergisus), a peculiu fish, alumdant in the western ivers and lakes of North America. It has many technically interesting peculiarities of structure, and forms a family by itself in the Physostomi order of bony lishes. It measures about a foot in length

Goldfinch (Carduche elegans), the most bean Goldfingh (Unductive degines), the most bean tiful of British finches (Fringallidæ). It is about tive inclies in length, has a thick, comeal, sharp pointed bill, and is noteworthy among British birds for its bundsone plumage, in which black, crinison red, yellow, and white are in the adult male, exquisitely unigled. The female has less crinison on the throat and no yellow on the breast, and the 'gray pate' or 'bald pate young are also of course much less gaily adorned than the full grown males.



Goldfinch (Carduelis elegans)

Goldfinelies ocem in small flocks on open uneulti Goldinelies ocem in small flocks on open unenital vated ground, feeding on thistles and other composites, or are found breeding in gardens and orelands. The nest, usually in a finit tree, is even neater than that of the chaffinch, lined with the finest down, but without behens, the eggs (4 or 5) are grayish white, with pumphish brown streaks and spots, there are two broods in the year, the voing are fed on insects. The goldfinch is still a common summer bind in Britain, especially in the goalth, ungest progration and an other programs. south, most migrate southwards in October It breeds throughout Emope, especially in the south, and ranges from the Canaries, through North Africa, to Persia Its soft pleasing song, intelliging genee, doeslity, Incliness, and loungness make it, to its cost, a favouite cage bid. See Howard Saunders, Manual of British Brids Sec Howard



Common Golden-1 od (a garden variety)

Goldfish, or Golden Carr (Carassius auratus), a Chinese and Japanese fresh-water fish nearly allied to the carp (Cyprinns), but lacking barbels. In its warm native waters it is brownish, like its neighbour species, the Cincian Carp (C. carassius), while in its more familiar domesticated state it loses the black and brown pigment, becomes goldenyellow, or passes more completely into albinism in those unpigmented forms known as silver fish. Young specimens are dark in colour, the loss of pigment and the consequent golden tint becoming marked as they grow older. It seems to have been introduced into England in 1691, and is often kept in aquaria, or with more success in ponds, especially in such as are warmed by an inflow of hot water from engines. In temperatures of 80° F, or more it thrives well and breeds abundantly. The goldfish is naturalised in some continental rivers, and has had a wide artificial distribution throughout the world. In aquaria the fish are best fed on worms, insects, and the like, and cane must be taken that the water is kept fresh. Monstrosities such as double or multiple tails or much modified fins frequently occur in artificial conditions. Of these the most remarkable is the 'telescope fish' with the eyes protraded in an extraordinary degree. See Mulertt, The Goldfish and its Systematic Culture (1884).

Gold Hill, a town of Nevada, 7000 feet above the sea, and about a mile S. of Virginia City, with rich silver-mines, and several quartz-mills. Here, on Montt Davidson, is the famous Comstock Lode (q.v.). Pop. 4531.

Goldilocks is a common name for the Ranunculus auricomus. See HANUNCULUS.

Gold Lace. This term is applied in a general way to more than one kind of fabric made of thread covered with gilt silver wire. The 'gold wire' used in the manufacture of gold thread is nearly always in India, where a great deal is made, composed of pure silver with a thin coating of gold. But in European countries it is only the very best qualities of this wire which are made of nualloyed silver. A good quality of English gold thread is made from wire consisting of one part of copper added to twenty-live of silver, which is afterwards coated with gold. But alloys of copper and silver in many proportions are used, some wire containing only one part of silver to sixty of copper. The silver, or alloy of copper and silver, is made into a rod 14 inch in diameter, and then annealed and polished to prepare it for its coating of gold. This is laid on in the form of leaves of pure gold, and the first to the leaves of the prepared to the leaves of the prepared to the leaves of the prepared to the leaves of the leaves o and subjected, for the best qualities of wire, to the fire-gilding process—i.e. the gold-coated rod is heated to reduces on huming charcoal, which causes the leaf to adhere firmly. Rods so treated are next smeared with wax, and drawn through the holes of a steel drawplate (see WIRE-DRAW-ING). The wire is frequently annealed during the process of drawing, and this requires to be very skilfully done, or the golden tint of the surface is lost. Gold wire for thread is generally drawn down to a size measuring 1100 to 1400 yards to the nunce of metal. Finer sizes reach the length of 1800 to 2000 yards to the onnce, and to attain this fineness as diamonds or rulies. The line wire, after being annealed, is llattened between polished steel rollers. Finally the flat wire, or rather rilhon, is wound over yellow or orange coloured silk, so as completely to envelop it, hy a spinning engine.
The gold thread is then finished. Some of the best qualities of the metal covering or 'plate' of this thread have 12 dwt. of gold to the pound of silver or of alloy. Inferior kinds have as little as 2 dwt. to the pound, and still cheaper sorts of thread

are covered with flattened copper wire which has received a thin coating of electro-deposited silver, and this afterwards receives, on the ontside of the thread only, a still thinner electro-deposited conting of gold—two grains of the precions metal covering 3000 square inches of surface. For this very cheap kind of thread yellow cotton is used instead of silk.

The only difference between gold and silver thread is that the thin coating of gold is wanting on the latter. Gold thread is used in the more

The only difference between gold and silver thread is that the thin coating of gold is wanting on the latter. Gold thread is used in the manufacture of military lace, which is made in several patterns for officers of different ranks and for various divisions of the army and navy. This, however, is a woven substance and not true lace; but some real lace is made both of gold and silver thread. Both kinds of thread are also used for facings of liveries, and for ecclesiastical robes, altar cloths, and hanners. These and other fabrics are either embroidered or woven, but often only in part, with the thread (see Brocade, Damask, and Embroidersy). Much of the gold thread used for theatrical dresses and decontions has only a covering of Dutch Metal (q.v.), and the silver thread in these is spun with a covering of a cheap white alloy, having a mere film of silver on the surface.

Gold Leaf. See GOLD-BEATING.

Gold of Pleasure (Camelina), a small genus of Crucifore. The common Gold of Pleasure (C. saliva; Fr. Cameline, Gev. Dotter) is an animal plant of lumble uppearance, but with abundant yellow flowers. It is most commonly known as a weed in lint-fields, although it is also cultivated alone or mixed with rapesced in parts of Germany, Belgium, and the south of Europe for the sake of the abundant oil contained in its seeds. Its seeds and oil-cake are, however, inferior to those of lint, and its oil is apt to become rancid and is less valued than that of rape or colza. The value of the plant in agriculture depends much on its adaptation to poor sandy soils, and on the briefness of its period of vegetation, adapting it for being sown after another crop has failed, or for being ploughed down as a green manure. The crop is ent or pulled when the ponches begin to turn yellow; but the readiness with which seed is scattered in the field, rendering the plant a weed for future years, is an objection to its cultivation. The stems are tough, fibrous, and durable, and are used for thatching and for making brooms; their fibra is sometimes even separated like that of flax, and made into very coase cloth and packing-paper. The seeds are used for emollicut ponltices. C. dentata is of similar habit and properties, but is not cultivated.

Goldoni, Carlo, the creator of the modern Italian comedy of character and domestic life, was born in 1707 at Venice. Although he went through a course of law studies there and at Pavia, his heart was set even from a child upon plays and playwriting. His lirst serious attempts were tragedies, one of which, *Belisatrio*, was successful at Venice in 1732. But he soon discovered that his fortewas comedy rather than tragedy, and set himself to effect a revolution in the Italian comic stage. At that time the popular comedies in Italy were really farces, in which pantaloon and harlequin filled the principal rôles, acting with masks on their faces, and trusting very largely to the inspiration of the moment for their bullooneries and pranks. For this style of thing Goldoni determined to substitute the comedy of character according to Molière, and a hard task he set himself. Several years were now spent by him wandering from etty to city of North Italy, sometimes practising his profession, but always in

intimate connection with companies of actors, for whom he wrote various comedies, until in 1740 he settled in Venice. Then for twenty years he poured forth comedy after concedy. In 1761 he made an engagement for two years to write for the Italian theatre in Paris, and for that purpose moved to the French capital. On the conclusion of this engagement he was appointed teacher of Italian to the daughters of Lonis XV., and remained attached to the court until the Revolution. He died 6th February 1793. Goldoni's comedies, more than 120 in number, some of the best of which are the Villeggiatura trilogy, Locandiera, Le Barufe Chiozzotte, Zelinda & Lindoro, Ventaglio, Lu Bottega di Caffe, and Dama Prudente, were for the most part put together too rapidly and too roughly to be adjudged first-rate. But, though they seldom touch more than the external and superficial aspects of life and society, they are marked by considerable skill in character-sketching, by faithful representation of contemporary manners, lively dialogue, and eleveness in the invention of comie situations. Goldoni wrote Memoires of his own life (1787), and published at Venice in 1788-89 the first collected edition of his own works in 44 vols. (3d ed. Florence, 53 vols. 1827). His correspondence has been edited by Masi (1880) and Mantovani (1884). See Lives by Molmenti (1879) and Golanti (2d ed. 1883), and Vernon Lee, Studies of the Eighteenth Century in Italy (1880).

Goldschmidt, MADAME (JENNY LIND), a celebrated Swedish singer, was born of humble parentage at Stockholm, October 6, 1820. Her musical gifts were apparent from her third year, and at nine she was admitted to the school of singing attached to the court theatre, where she received lessons of Berg and others. She sang before the court with spaces, and at sighteen appeared the court with success, and at eighteen appeared in the rôle of Agatha in Der Freischutz, Alice in Robert le Diuble, &c., and som became the principal support of the royal theatre. In June 1841 she went to Paris to receive lessons from Garcia. Meyerbeer, who heard her at this time, prophesied a brilliant future for Jenny Lind. Her voice was now thought wanting in volume, and when she appeared at the Grand Opera two years later her failure was so mortifying that she is said to have she went to Berlin, and for a time studied German; returning to Stockholm, she was heard with entinesiasm in Robert le Diable, and at the instance of Meyerbeer was engaged at Berlin in October, appearing in *Norma* and Meyerbeer's operas. In 1846 she visited Vienna, in 1847 Landon. Prices at Her Majesty's rose to a fabulons height, and 'the town,' says Chorley, 'sacred and profune, went mad about the Swedish Nightingale.' Her voice at this time has been described as a soprano of bright, thrilling, and remarkable sympathetic quality, with wonderfully developed length of breath, and perfection of execution. She could sing up to high D in vich, full tones, and even touch higher notes; she literally warbled like a hird; and especially striking was her rendering of the weird Swedish melodies. Her return visit to London in 1848 was an immense trimph; and in London, on 18th May 1849, she sang on the stage for the last time in Roberto; henceforth her appearances were confined to the concert-room. Her share of the profits of a brilliant concert tour in America under Barmm's management (1849-52), amounting to £35,000, was more than spent afterwards in funding and endowing musical scholarships and charities in her native country. In 1851 she was married at Boston to Otto Goldschmidt, a native of Hamburg, her pianist. Returning to Europe, she continued to sing at concerts and in oratorios, as in London

(1856), and for the last time at Dusseldorf (1870). Her English charities included the gift of a hospital to Liverpool and of the wing of another to London. She founded the Mendelssohn scholarship, and her interest in the Bach Choir, of which her husband was conductor, was shown by her careful training of the female chorus. Her voice retained its sweetness to the last, although she did not care to sing much even in the semi-privacy of a crowded drawing-room. But from 1883 till 1886 she was professor of Singing at the Royal College of Music. She died near Malvern, November 2, 1887. Her moral character was elevated and deeply religious; and 'her smile,' said Bishop Stanley of Norwich, 'is, with the exception of Dr Pusey's, the most heavenly I ever beheld.'

Goldsinny, or Goldfinny (Crenilabrus melops), also called the Cork-wing, a small fish of the Wrasse family (Labridæ), common on British coasts. Like other members of its family, it hannts the neighbourhood of rocks, feeding on crustaceans, molluses, and the like. In colour it is more or less green or yellow, darker above, striped along the sides, with a dark spot on the tail. Like young wrasse, but unlike the adults, it has a serrated bone (preoperenlum) on the side of its gill-cover.

Goldsmith, OLIVER, was born at Pallas, in Longford, Ireland, on the 10th November 1728, his father, the Rev. Charles Goldsmith, a elergyman of the established church, being at that time curate to the rector of Kilkenny West. When six years old Goldsmith was placed under Thomas Byrne, the schoolmaster described in the Deserted Village. After an attack of smallpox, he went successively to various local schools, ultimately entering Trinity College, Dublin, as a 'sizar,' or poor scholar, on the 11th June 1744. As yet he had shown no exceptional ability, nor did he show any at the university. tional ability, nor did he show any at the university. His tutor was rough and unsympathetie; he himself was pleasure-loving and poor. His father died, and his eirennestances grew worse. In 1747 he was involved in a college riot, and, escaping from the consequences of this only to full into further disgraces, finally ran away from his Alma Mater. Matters being patched up by his elder hother, he returned, taking his B.A. degree, 27th February 1749. His uncle, the Rev. Mr Contarine, now his chief friend, wished him to qualify for orders, but he was rejected by the bishop of Elphin. Therenpon he made a false start for America. Getting no Getting no he made a false start for America. farther than Cork, he was next equipped with £50 to study law in London. This disappeared at a Dublin gaming-table. In 1752 he started for Scotland to study physic. Reaching Edinburgh, he stayed there nearly two years, leaving, however, helind him more legends of his social gifts than his professional again remarks. From Edinburgh he professional acquirements. From Edinburgh he drifted to Leyden, again lost at play what little money he had, and finally set out to make the 'grand tour' on foot. After wandering through Flanders, France, Germany, and Italy, and obtaining, either at Louvain or Padua, a dubious degree as M.B., he returned to England in February 1756, with a few helps are in his product. with a few halfpence in his pockets. It is thought he tried strolling; it is certain that he was assistant to an apothecary. Then, with the aid of an Edin-lungh friend, he practised as a poor physician in Southwark—a profession which he speedily quitted for that of proof-reader to Richardson, in turn ahandoning this to be usher in Dr Milner's 'classical academy' at Peckham. At Dr Milner's he became acquainted with Griffiths, the proprietor of the Monthly Review, who engaged him as author-of-all-work. His bondage to Griffiths lasted only a few months. His next mode of subsistence is obscure, but in February 1758 appeared his first definite work, a translation in two volumes of the Memoirs

of Jean Marteilhe of Bergerae, a 'Protestant condemned to the galleys of France for his religion.'
For this he used the name of a schoolfellow, James Willington, but the book is known to have been his own. After its appearance he went back to Peckham, to wait for an appointment on a foreign station, which Dr Milner had promised to obtain for him. To procure the funds for his outfit he set about an Enquiry into the Present State of Polite Learning in Europe. From some mexplained cause, however, his nomination, when received, fell through, and in December we find him endeavouring to pass at Surgeons' Hall for the humbler post of hospital mate, but without success. What was worse, the clothes he went up in had been obtained on the security of his old employer Griffiths; to pay his landlady he paymed them, and the angry bookseller threatened him with a

debtor's prison,

Shortly afterwards, in April 1759, the Enquiry was published. It attracted some notice, and better days at length dawned on Goldsmith. He started the periodical called The Bee (1759), and contributed to The Busy Body and The Lady's Magazine. Then came to his miserable lodging in Magazine. Then came to his miscrable lodging in Green Arbour Court, Old Bailey, overtures from Smollett, and John Newbery, the hookseller. For the British Magazine of the former he wrote some of his best essays; for the Public Ledger of the latter the colehrated Chinese Letters (afterwards published as The Uttizen of the World), which appeared in 1760-61. In May of the latter your he moved to 6 Wine Office Court, Fleet Street, where, on the 31st of the same mouth, he was visited by Johnson. In 1762, among other thines, he pub-Johnson. In 1762, among other things, he published a Life of Richard Nash, the Bath master of the ecremonics; and he sold to Benjamin Collins, a Salisbury printer, a third share in the yet-unpublished Vicar of Wakefield. In 1764 the 'Club,' known many years afterwards as the 'Literary Club,' was founded; and he was one of its nine Club,' was founded; and he was one of its nine ariginal members. His next work was an anonymous History of England, in a Scries of Letters from a Nobleman to his Son. This was followed in December 1764 by The Traveller, a poem which at once raised him to a foremost place among the minstrels of the day. Two years later, in March 1766, appeared The Vicar of Wakefield, by which his reputation as a novelist was secured. The stage alone remained untried, and this, after two more years of proface writing and journey work he more years of proface writing and journey-work, he attempted with The Good Natur'd Man, a connedy, produced at Covent Garden in January 1768. It was a moderate success. But he again escaped from enforced compilation (Histories of Rome and England, History of Animated Nature) with his best poetical effort, The Deserted Village (1770); and three years afterwards achieved the highest drainatic honours by She Stoops to Conquer, still one of the most popular of English acting coincides. A year later (April 4, 1774) he died in his chambers at 2 Brick Court, Middle Temple, of a fever, aggravated by the obstituacy with which he had relied upon the popular remedy known as James's pewder. He was buried on the 9th, in the hurial-ground of the Temple Church, in the triforium of which is a tablet to his memory. The club erected a manument to him in Westminster Albey. In the year of his death was published the unfinished series of rhymed sketches of his friends, called Retaliation, and in 1776 the jeu d'esprit, entitled The Haunch of Venison; an Epistle to Lord Clare.

Peor in his yenth, Goldsmith was not prudent in his more prosperous middle age. Ho died £2000 in debt, and there is reason for supposing that his difficulties embittered his latter days. When his dector asked him on his deathbed if his mind was

at ease, he replied that it was not. Goldsmith had some constitutional disadvantages and many obvious faults, mostly of a harmless kind. But he was thoroughly warm-hearted and generons, and full of unfeigned love and pity for humanity. As a writer, in addition to the most fortunate mingling of humour and tenderness, he possessed that native charm of style which neither learning nor lahour can acquire. In the felicitous phrase which Johnson borrowed from Fénelon for his critical, he tauched nothing which he did not adon. Prior first collected the material for his biography in 1837; in 1848 Forster prepared from this (not without expostnlation on Prior's part) this (not without expostnlation on Prior's part) his well-known life. Washington Irving's genial sketch of 1849 was based upon Forster. Later memoirs by the present writer are to be found in the 'Men of Lotters' series (1878) and the 'Great Writers' (1888). The last contains a bibliography; and a special bibliography of The Ficur of Wakefield is prefixed to the fac-simile edition of that book issued in 1885. The most modern edition of Gold-writes accordance works is that by Gibbs 15 rele smith's complete works is that by Gibbs (5 vols. 1881~86).

1881-86).

Goldstücker. Theodon, Sanskrit scholar, was born of Jewish parents on 18th January 1821, at Königsberg, studied there, at Bonn, and at Paris, and established himself as privad-docent at Berlin. He came to England in 1850 on the invitation of Professor II. Wilson, and in 1852 was appointed professor of Sanskrit, University College, London, a post he held till his death, 6th March 1872. Founder of the Sanskrit Text Society, he was an active member of the Philological and Royal Asiatic Societies. He wrote all logical and Royal Asiatic Societies. He wrote all and toyal Nature Sucted St. He wrote all the most important articles on Indian mythology and philosophy (67 in number) in the first edition of this Encyclopaedia, and contributed to the Athenaum and Westminster Review. Of his separately-published works the most notable are Panini: his published works the most notatile are Plane; his Place in Sanskrit Literature (1861); the Sanskrit text of the Jaminfyn-Nyâya-Mâlâ-Vistara (cempleted by Professor Cawell); and part of a great Sanskrit Dictionary. He projected immerous other works, including a text of the Mahâlhârata, fer which he had made vast collections of materials. His Literary Remains (2 vols. 1879) comprises, with other papers, the articles contributed to Chambers's Encycloperdia.

Gold-thread, the popular name in America for Coptis trifolia, a runniculaceous plant found from Demmark to Siberia, and over the North American continent through Canada into the United States. The leaves are overgreen and like those of the strawberry, but smaller; the flowers are small and white. The name 'goldflowers are small and white. The name 'gold-thread' is given to the abundant silk-like root-stocks, still a nopular remedy among the French Canadians for ulcerated throats.

Goletta (Fr. La Goulette), the port of the city of Trans, from which it is 11 miles N. by rail or canal. In the new quarter are the bey's palace, a large dock, and an arsenal defended by a battery. The population, ranally about 3000, is trebled during the visit of the bey in the bathing season; the proportion of Europeans has greatly increased, and many of the houses are now built in the European style. The harbour, though by no means secure, is the most frequented in Tunis; but since the establishment of a French protectorate much of the trade has passed to Bona, in Algeria; and the place must lose all its importance whenever the protected descriptor of the larger path of the projected deepening of the lagune north of Tunis is accomplished.

Golf, or Goff, a pastimo almost peculiar to Scotland, derives its name from the club (Dutch kolf) with which it is played, The game is GOLF

certainly of great antiquity, and frequent references are made to it in old Scottish records. In 1457 the Scottish parliament passed an act enjoining that 'Fute ball and Golfe he utterly cryit downe, and nocht usit, and that the bowe merkis be maid at ilka paroché kirke a paire of buttis, and schutting be usit ilk Sunday.' A similar act was passed in May 1491. It thus appears that the game was at one time so popular in Scotland that the more important practice of archery, for the defence of the country, stood in danger of being neglected. In 1592 the magistrates of Edinburgh issued a proclamation against playing the game on

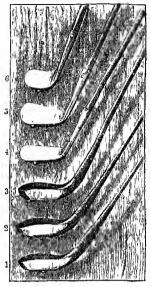
Reference is made to golf on Leith Links in A Diurnal of Occurrents within Scotland, 1516-75 (Maitland Club, 1832), and it appears to have been practised by all classes in the reign of King James VI. Charles I. was much attached to the game, and on his visit to Scotland in 1641 was engaged in it on Leith Links when intimation was given him of the rebellion in Ireland, whereupon he threw down his club, and returned in great agitation to Holyrood House. The Duke of York, afterwards James II., also delighted in the game.

Until late years golf was entirely confined to Scotland, though the oldest existing golf chib was founded by James I. at Blackheath in 1608; but now it is firmly established south of the Tweed, and clubs have been formed in almost every locality in England where the ground is at all suitable for the game. Golf is played at several stations in India, as well as in Canada and Cape Colony; and clubs were formed at Caiv in 1888 and at Nav Prayison in 1880. The India of the Island and Cape Colony; and clubs were formed at Caiv in 1888. Colony; and clubs were formed at Caro in 1888 and at San Francisco in 1889. Ladies' gulf clubs exist in a flunrishing condition at St Andrews, North Berwick, Westward Ho, &c. The game is played on what are called in Scotland links (Eng. downs)—i.c. tracts of sandy soil covered with short grass, which occur frequently along the east coast of Scotland. The best Scotch golfing links are St Andrews and Leven in Fife, Prestwick in Ayrshire, Moderblanish in Arrellshire, North Berwick and Machrihanish in Argyllshire, North Berwick and Unllane in East Lothian, Carnonstie and Montrose in Forfarshire, and Dornoch in Sutherland. England the most important centres are Hoylake near Liverpool, Westward Ho in Devonshire, near Liverpool, Westward Ho in Devonshire, Wimbledon near London, and Sandwich in Kent All of these are examples of admirably suited links, as the ground is diversified by knolls, sandpits, and other hazards (as they are termed in golding phraseology), the avoiding of which is one of the most important points of the game.

A series of small round holes, about four inches in diameter, and several inches in depth, are ent in the turf, at distances of from one to five or six hundred yards from each other, according to the nature of the ground, so as to form a circuit or round. The round generally consists of either nine or eighteen holes as the length or nature of the course may allow. The links of St Andrews eontain eighteen holes, and two hours are occupied in completing the round. The rival players are either two in number, which is the simplest can the two harmonist two), in which case the two partners strike the hall on their side alternately. The balls, weighing somewhat under two ounces, are made of gutta-percha, and painted white so as to be readily seen.

An ordinary galf-club consists of two parts spliced together—viz. the shaft and head: the shaft is usually made of hickory or lancewood; the handle covered with leather; the head (heavily weighted with lead helind, and with a slip of horn along the front of the sole) of well-seasoned appletuee or beech. Every player has a set of clubs, differing in length and shape to snit the distance to be driven and the position of the ball; for (except in striking off from a hole, when the ball may

be tcc'd-i.e. placed advantageon'sly on a little licap of sand, called a tec) it is a rule that the ball must be struck as it happens to lie. Some positions of the ball require a chib with an iron head. The usual complement of clubs is about seven; but those who refine on the gradation of implements use as many as ten, or even twelve, which are technically distin-guished as the driver, long-spoon, mid-spoon, short-spoon, brassey, putter, iron, loftshort. ing-iron, mashic, iron-putter, cleck, niblick-the last six have iron heads, the others are of wood. Every player is usually



Club Heads: 1, driver; river; 2, mid-spoon; 3, putter; 4, cleek; 5, iron; 6, niblick.

provided with an attendant, called a caddy, who carries his clubs and 'tees' his balls.

Commencing at a spot a few yards in front of the home hole—the teeing ground—each player drives off his ball in the direction of the first hole, into which he does his best to put the ball in fewer strokes than his antagonist. If the players he pretty equal in skill, the chances are that they both arrive at the hole and put their balls in in an equal number of strokes, in which case the hole is said to be hulred, and scores to neither; but if one, by superior play, holes his ball in fewer strokes than the other, he gains that hole, and so takes precedence (the honour) in striking off towards the next. In this manner they proceed from the first towards the second hole, and so on till the entire round is finished, the round being gained by the player who has achieved the greater number of holes. Sometimes the interest of a match is maintained till the very last, by a succession of evenly-played holes, or by each having gained an equal number during the round; nor is it of very unfrequent occurrence to see round after round halved, and the contesting parties leave off all even on the day's play. 'All even on the day's play' may also be declared where each party has won the same number of rounds as his antagonist, or antagonists. A match may also or an agoinst. A match may also consist of a certain number of holes independently of rounds, when it of course accrues to the winner of the greater number of holes. In important matches the latter is the usual method adopted for deciding the relative skill of rival players; and in contests between professional players the match usually consists of a certain number of holes to be contested on more links than one.

The number of strokes taken between each hole depends on the skill of the player, the distance to be traversed, and the nature—hazardous or otherwise—of the intervening ground. And here it may be observed that, throughout the entire game, he whose ball lies farthest from the hole which he is approaching invariably plays before his more advanced companion. We have already said that the player who 'holes' his ball in fewer strokes

than his rival wins that hole. Now, if it is agreed that the match shall fall to the player who holes the entire round in fewest strokes, as in playing for medals or other prizes, each stroke is scrupulously recorded, and scored on a card; but if the match is to be yielded to the winner of the greatest number of holes in a round, the number of actual strokes need not necessarily be reckoned. Golf, like all other games, has its especial phraseology.



Method of holding the Club in driving.

Thus, he who is about to play the same number of strokes as his antagonist has already played, plays the like; if he is about to play one stroke more than his rival has already played, he plays the odds; it one stroke less, he one plays if two two:strokes more, two more, and so on. This method of reckoning, though somewhat confusing at first, is after a little time easily acquired; and, from its be-

ing universally adopted on golfing courses, should receive especial attention. In the accompanying illustrations the method of holding the club when driving, and the swing, are shown.



The Swing in driving.

To play the game of golf well requires long practice, and very fow attain to great excellence who have not played from their youth. But any one may in a year or two learn to play tolerably, so as to take great pleasure in the game; and for all who have once entered upon it it possesses no ordinary fascination. It has this advantage over many other outdoor games, that it is suited for

both old and young. The strong and energetic find scope for their energy in driving long balls (crack players will drive a ball above 200 yards); but the more important points of the game—an exact cye, a steady and measured stroke for the short distances, and skill in avoiding hazards—are called forth in all cases. Along with the muscular exercise required by the actual play, there is a mixture of walking which particularly suits those whose pursuits are sedentary—walking, too, on a breezy common, and under circumstances which make it far more beneficial than an ordinary 'constitutional.'

Golf associations are numerons in Scotland, and in most cases are governed by the rules laid down by the Royal and Ancient Golf Club of St Andrews (1754), which is the chief, and one of the oldest clubs in the country. These rules have been very generally adopted all over England. English golfers are at the same time much indebted to the exertions of the late Mr George Glennie, sometime captain of the Royal Blackheath Golf Club, for keeping the game alive at Blackheath while for many years it was unknown elsewhere in the south; and it was mainly his fostering influence which promoted its growth on other southern greens. Many professional players make their livelihood by golf, and are always ready to instruct beginners in the art, or to play unatches with amateurs. Among the most famous professional golfers were Allan Robertson (died 1859), and latterly young Tom Morris (died 1875). Perhaps the greatest golfer of modern times, Morris first distinguished himself when sixteen years of age at Camoustie, by beating all conners, professionals and amateurs alike; and after a long series of victories he succeeded in winning the champion belt three years consecutively (1868-70), and thus retaining it as his own property.

For information concerning the rules of golf and the history of the game from the earliest records, see Golf: a Royal Ancient Game, by Robert Clark (Edin. 1870); tolfany (W. & R. Chambors: Edin. 1887); The Art of Golf, by Sir W. Simpson (Edin. 1888); Golf in the 'Badminton Library,' by H. Hutchinson, A. J. Balfour, A. Lang, Sir W. Simpson, and others.

Golgotha. See CALVARY.

Goliath Beetle (Goliathus), a genus of tropical Lamellicorn beetles, in the sub-family Cetonide. They are distinguished by their large size, by the horny processes on the heads of the males, and by



Goliath Beetle.

the toothed lower jaws or maxille. Several species frequent tropical and South Africa, and related genera occur in tropical Asia. The male of the largest form, Goliathus druryi, from the Gold Coast, measures about four inches in length. In colour, as well as sizo, these goliaths and their relatives are splendid insects. The family Cetonidæ

is familiarly represented in Europe and Britain by the Rosechafer (Cctonia aurata).

Göllnitz, or Gollniczbanya, a mining town of Hungary, in the county of Zips, 17 miles SW. of Eperies. It has important iron and copper mines, and ironworks. Pop. 4353.

Gollnow, a town of Prussia, in Pomerania, is situated 15 miles NE of Stettin. It was formerly a Hanse-town; it now has limekilns and a trade in timber. Pop. 8430.

Golomynka (Comephorus or Callionymus baikalensis), a remarkable fish, found only in Lake Baikal, the only known species of its genns, which comes near the golies, but is the type of a distinct family. It is about a foot long, is destitute of scales, and is very soft, its whole substance abounding in oil, which is obtained from it by pressure. It may be almost said to melt into oil on the application of five. It is never eaton. on the application of fire. It is never eaten.

Goloshes (Fr. galoche, 'a patten, clog, or wooden shoe;' from the Low Lat. calopedia, 'a clog,' and the Gr. kalopous), india-rubber overshoes which were introduced into Great Britain from America about the year 1847. At first eluminary from America about the year 1847. At first elum-sily made, and of inferior quality, they were, mainly by the exertions of the Hayward Rubber Company in America, soon much improved in quality and appearance, and the demand for them increased rapidly. The largest manufactory for the production of vulcanised rubber goloshes and other shoes in Great Britain is that of the North British Rubber Company at Edinburgh, where more than 100 distinct kinds of boots and shoes are used, and the production amounts to several are made, and the production amounts to several

are made, and the production amounts to several thousand pairs a day.

The rubber is (1) torn up into small pieces, washed, and rolled together in granulated sheets; (2) it is then unixed, by the aid of heated rollers, with the vulcanising materials, consisting of sulphur, litharge, lampblack, pitch, rosin, and sometimes other materials; (3) the final stage in the preparation of the material is carried out after the shoes are made and consists in subjecting them for nine Fare made, and consists in subjecting them for nine hours to a temperature of between 200° and 300° F. Rubber so treated is said to be vulcanised (see INDIA-RUBBER). The so far prepared sheets of material are again rolled out between the heated rollers, till they are of the required thickness for the shoe uppers. Both soles and uppers for each shoe are cut out separately with a knife. The calico or other linings are coated round the edges with some strongly adhesive cement, probably dissolved rubber, and then all the pieces are ready to be put together. The earlier part of the work is done by men, but women actually make the shoes. A clever girl will make forty pairs a day; a very clever one lifty. That is to make a pair of shoes in ten or twelve minutes.

The chief defect of goloshes is that they keep the stockings constantly damp, and the feet incomfortable, by preventing the escape or the absorption of the porspiration. Various modifications of the ordinary goloshes are made: thus, there is a kind with warm felt lining; another kind have felt or cloth uppers and ankles, and are often called snow-

Gomar, FRANCIS, theologian, and leader of the party who opposed most zealously the doctrines of Arminius (q.v.). Gomar, or Gomarns, was born at Bruges, 30th January 1563, studied at the universities of Strasburg, Heidelberg, Oxford, and Cambridge, in the last-mentioned of which he took his degree of B.D. in 1584. In 1594 he was appointed professor of Divinity at Leyden, and signalised himself then and ever after by his vehement antipathy to the views of his colleague, Arminius. At the synd of Doxt in 1618 he was possibly instrumental synod of Dort in 1618 he was mainly instrumental

in securing the expulsion of the Arminians from the Reformed Church. He died as professor at Groningen, 1641. An edition of his works was published at Amsterdam in 1645 and 1664.

Gombroon', called also BENDER ADBAS, a seanort of Persia, in the province of Kirman, stands on the Strait of Ormuz, opposite the island of that name. Bender Abbas owed its name and importance to Shah Abhas, who, assisted by the English, drove the Portuguese in 1622 from Ormuz, runed that scaport, and transferred its commerce to Gombroon. For a while the new town prospered; but at present it is a wretched place of about 8000 inhabitants, mostly Arabs, who trade to the extent of £450,000 per animm in piece goods, sugar, tea, and pottery (imports), and in carpets, wool, tobacco, saffron, opium, almonds, and madder (exports).

Gome'ra, one of the Canary Islands (q.v.). Gomorrah. See Sodom and Gomorrah.

Gonad, a technical name for reproductive organs. See REPRODUCTION.

Gonaïves, a seaport of Hayti, on a beautiful bay on the west coast, with an excellent harbour, 65 miles NNW. of Port au Prince. It exports coffee, cotton, logwood, and hides. Pop. (1887) coffee, cotton, logwood, and hides.

Goncourt, Edmond and Jules de, a pair of French novelists, horn, the former at Nancy, May 26, 1822, the latter at Paris, 17th December 1830. They were not men of letters but artists primarily, and in 1849 they set out knapsack on back to traverse France for drawings and water-colours. Their notebooks made them writers as well as artists, and already in 1852 they had commenced that literary partnership which after twenty years of obsenve labours was to conquer the public and stamp its impression upon the modern novel more strongly than any one had done since Balzac. Their earliest serious works were a group of historical studies upon the second half of the 18th century, intended to be an effective resurrection of its habits of life, manners, and costume. With all their elaboration manners, and costume. With all their elaboration of details these were ineffective and superficial from their lack of the calm and impartial historical sense, to say nothing of the absence of more essential qualities still-breadth of view, and that creative grasp of character by sympathetic insight which is the rarest gift of the historian. The tilting of is the reference of the distortant. The billing of the 'Castor and Pollux of brie à brae' against the gigantic figures of the Revolution was almost too pitiful to be amusing. These books were Histoire de la Société Française pendant la Révolution (1854), de de Societé Française pendant de Levouron (1854), La Société Française pendant le Directoire (1855), Portraits intimes du XVIIIº Siècle (1856-58), Histoire de Marie Antoinette (1858), Les Maîtresses de Louis XV. (1860), La Femme au XVIIIº Siècle (1862), and L'Amour au XVIIIº Siècle (1875), Of nucle more real value is Gavarni (1873), L'Art au XVIII^o Siècle (1874), and the later books devoted to Watteau (1876) and Prudhon (1877).

But the important work of the De Goncourt brothers commenced when they assumed the novel as the mould into which to pour the metal of their prolonged and exact observation. Their conception of the novel was that it should be an imaginative attempt to grasp and summarise the results of this; and the task they put before themselves was to unite by means of a plot such as might have happened a multitude of observed facts, and to cast around these an atmosphere which should illumine them. Their aim was to paint manuers by taking the traits in which one man resembles a class, rather than to grasp personal character by the points wherein one man is distinguished from another, in the manner of Balzac or George Eliot. Hence they select as generic types only persons of moderate faculties, and herein they are poorer than nature

herself, which not only creates classes and gromps but exceptional figures also. Their figures submit to life without subduing it, and are weighed down by that irresoluteness of will and morbid sensitiveness to suffering which is the especial disease of our age. Their subject is not so much the passions as the manners of the 19th century, and their sense of the enormous influence of environment and habit upon man necessitated so close a study of the arts of contemporary life that their work will be valued by future historians as a storelhouse of materials. Their descriptive part is always especially prominent, and their stories usually commence without explanation and end without denonement.

The novels in which the brothers carried out their theories display a marvellons unity, despite their double origin. The first, Les Hommes de Lettres (1860; new ed. as Charles Demailly), was followed by Sear Philomène (1861), Renée Maaperin (1864), Germinic Lacerteux (1865), Manette Salomon (1867), and Madamo Gervaisais (1869). The last is their

greatest novel, the sharp and painful analysis of which was too close a reflex of themselves. Indeed, the weaker of the two did not survive this book, which may be said to have been written with his very heart's blood. After the death of Jules, 20th June 1870, Edmond issued the extraordinarily popular La Fille Elisa (1878), La Fanstin (1882), and Chérie (1885). The interesting Idées et Sonsations (1866) had already revealed to the world their morbid hyper-aenteness of sensation so fatal to nervous health and to that equilibrium of sanity which belonged to Goethe, Victor Hugo, and all the Olympians; and La Maison d'un Artiste (1881) had shown their patient love for brie-a-brae and its reflex influence mon the mind; but

influence upon the mind; but the Lettres de Jules Goncourt (1885), and still more the Journal des Goncourt, vol. i. 1851-61 (1888), have disclosed their formal conception of fiction and their method of work so fully, that the latter may be accepted as the formal and definite propaganda of a school which numbers all the cleverest among the young novelists of France. See a fino study by Paul Bourget in his Nouveaux Essais de

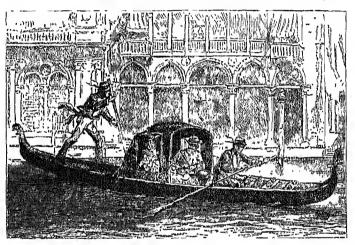
Psychologie (1885).

Gondar, capital of Amhara in Abyssinia, is situated on a basaltic hill 23 miles N. of Lake Tzana (see Abyssinia). Gondar was formerly the residence of the emperor, and at one time had about 50,000 inhabitants; its population numbers at present barely 4000, though there are still some forty churches. The hill is crowned by the min of the old castle, built by Indian architects under Portuguese direction; burned by Theodore in 1867, it is now left to the bats and hyunas. The Mohammedan town (Islambed), at the foot of the hill, formerly noticeable for its clean streets and pretty houses, has been descred in consequence of an edict commanding the baptism of the inhabitants; but the Falashas are permitted to keep their Jewish quarter. Part of the town was burned by the Dervishes in 1889. There are manufactures of fine leather and gold and silver filigree-work, church vessels, and musical instruments; and the priests are masters of penmanship, and prepare religious paintings, reading-desks, and praying-stools. Most

of the young priests of Abyssinia are educated here. There is a considerable transit trade.

Gondo'koro, a trading-post in the country of the Bari negroes, on the Upper Nile, in about 4° 54′ N. lat. A Gatholic mission founded here in 1853 was discontinued in 1858 owing to the bad climate and the hostility of the slave-traders. It is now described during the greater part of the year, but in December and January merchants arrive and establish an important ivory-market, which was formerly also a centre of the slave-trade. To put this down Baker established a strong military station here in 1871, and changed the name to Ismailia; lmt, before the abandonment by Egypt of its possessions in Central Africa, Gordon removed the station to Lado, 6 miles lower down the Nile.

Gon'dola (Ital.), a long narrow boat (averaging 30 feet by 4) used chiefly on the canals of Venice. The prow and stern taper to a point, and entry high out of the water. In the centre there may or may not be a cartained chamber for the occupants.



Venetian Gondola.

The boat is usually propelled by one man standing at the stern, by means of a large sweep very deftly and powerfully handled by the gondolier; or there may be another man at the bow. Immense smus were spent by the wealthy on the luxurious adorument of their gondolas, till in the 16th century samptaary laws were passed, the consequence of which was that the ordinary gondola came to be of the plainest funereal black, with black cloth cushious and fittings—in Byron's phrase, 'just like a coffin clapp'd in a canoe.'

Gondomar, Diego Sarmiento de Acuña, Marquis de, Spanish ambassador in England from 1613 to 1621. He acquired great influence over King James I., and plied him with all the arts of persuasion to induce him to bring the projected Spanish match, the marriage of Prince Charles with the Infanta, to a successful termination. The ruling motive of his policy was, however, the warmly cherished hope of being able eventually to convert the English nation to Roman Catholicism. See S. R. Gardiner, Prince Charles and the Spanish Marriage (1869).

Gonds, a Dravidian people, the most important of the non-Aryan or 'aboriginal' hill-races of the Central Provinces (q.v.) of India. They probably entered the country at an early period from the north, and gave their name to thendwana, which comprised the greater part of the Central Provinces;

but it was only from the 16th century to the Mahratta invasion in 1741-81 that they ruled the central tableland. To-day they number about a million and a half, and, while the wilder tribes cling to the forest, the rest have made some advances in civilisation. Most of the upper classes are of mixed blood, and many of the race have embraced Hinduism; but, while they carry ceremonial refinements to the extremest limit, they secretly retain many of their old super-stitions, with which they have even inoculated their Aryan co-religionists in the territory. The plebeian Gonds are of purer blood, and, as among the other hill-tribes, both sexes limit their necessary attire to a cloth wound about the waist, although the younger people often eke this out with earrings, bracelets, and necklaces. Each village worships the three or four deities it knows best, while admitting the existence of an indefinite number of others. Cholera and smallpox are worshipped everywhere, and the Gonds people the forest, the rivers, and every rock with evil spirits. The name Gondwana is still applied to the tract which they principally inhabit.

Gonfalon (Ital. gonfalone), or GONFANON, an ensign or standard (see Flag), in virtue of bearing which the chief-magistrates in many of the Italian cities were known as gonfaloniere (see Florence).

Gong, a Chinese instrument of percussion, made of a mixture of metals (78 to 80 parts of copper, and 22 to 20 parts of tin), and shaped into a basin-like form, flat and large, with a rim a few inches deep. The sound of the gong is produced by striking it, while hung by the nm, with a mallet, which puts the metal into an extraordinary state of vibration, and produces a loud piereing sound.

Gongora. Luis de Góngora y Argote, Spanish lyric poet, was born at Cordova, 11th July 1561. After a course of study in law at the university of Salamanca, he settled down in his native city to cultivate the poetic talents of which he had already shown conspicuous proofs as a student, About 1604 he entered the church, and became a prebendary of the cathedral at Cordova, and eventually chaplain to Philip III. He died in his native city, 28d May 1627. Gongora's earlier writings—sonnets on a great variety of subjects, lyrical poems, odes, ballads, and songs for the guitar—are inspired with much true poetic feeling. His later works, consisting for the most part of longer poems, such as Solidades (or Solitary Musings), Polifono, Pyramo y Thisbe, are executed in an entirely different and novel style, characterised, especially in respect of diction, by some of the same distinctive features as are found in Euphnism in England and Chiabrerism in Italy. This later style of Gongora, which his followers and imitators designated the stilo culto, is florid, pedantic, full of Latin inversions and mythological allusions, pompous, and mannered, and in many places very obsence. His works were never published during his lifetime. The first edition was printed by Vicuña in 1627, good but incomplete; another good one is that of Brussels (1659). See Churton's Gongora (2 vols. Lond. 1862).

Goniatites, a genus of fossil cephalopodous molluscu, belonging to the same family as the Ammonites. The genus is characterised by the structure of the septa, which are lobed, but without lateral denticulations, as in Ammonites; they consequently exhibit, in a section, a continuous undulating line. Some forms with slightly waved septa approach very near to the Nautilus. The siphonal portion is shorter than the sides, forming a sinus at the back, as in the Nautilus. The last chamber, the one tenanted by the animal, occupies a whole whorl, and has besides a considerable

lateral expansion. The shells are small, seldom exceeding 6 inches in diameter. This genus is confined to the Paleozoic strata: nearly two lumdred species have been described from the Devonian, Carboniferons, and Triassic systems.

Gonidia, an old term in lichenology for the green cells (algal constituents) of the thallus. See LICHENS.

Goniometer (Gr. gonia, 'an angle;' metron, 'a measure'), an instrument used for measuring solid angles, and hence indispensable to the crystallographer. There are two kinds in use, the context goniometer of Carangeau (which is sufficiently accurate for many purposes, but cannot be used in the case of very small crystals), and the reflecting goniometer by Dr Wollaston. In skilful bands this instrument can measure the angles of crystals only the hundredth of an inch in size. Several elaborate modifications of this goniometer are now employed by crystallographers.

Gonorrhea (Gr. gonos, 'progeny or seed,' and rhcō, 'I flow'), a name originally applied almost indiscriminately to all discharges from the genital passages in both sexes, but especially in the male. In the course of usage the term has been almost entirely restricted to the designation of one particular kind of discharge, which, from its connection with a contagions poison, was originally called, in strict no-ological language, G. virulenta. This form of the disease is usually caused by the direct communication of sound persons with those already affected; and accordingly gonorrhea is one of the numerous penalties attending an indiscriminate and impure intercourse of the sexes (see Syphilis). Gonorrhea is a very acute and painful form of disease; it is liable, also, to leave its traces in the more chronic form of gleet, which may last for a considerable time. Often, moreover, it leaves some of the parts affected permanently damaged, and stricture, sterility, &c. may result. The only constitutional effect of any importance is a very intractable inflammation of joints, closely resembling rheumatic fever, which occasionally follows it. The name genorrhea was formed on the erroneous supposition that the discharge consists of the spermatic fluid whereas the discharge of the spermatic fluid, whereas, the disease being an inflammation of the mucous membrane of some an inflammation of the nuceous membrane of some part of the generative organs, the discharge is the nuce-purulent or purulent discharge from the diseased surface. Hence the name Blennorrhagia has been proposed for the ailment. The disease may reach its height in a period of from one to three weeks; it then usually subsides, and the various country where the country of the proposed for the proposed for the proposed for the proposed for the period of the period various symptoms abate in severity. For gonor-rheal ophthalmia, see Eye (DISEASES OF). Victims of gonorrhea and the allied disorders should be warned against consulting any but medical men of bigh standing and undoubted character.

Gonsalvo di Cordova (the name by which Gonzalo Hernandez y Aguilar is usually known), a celebrated Spanish warrior, was born at Montillo, near Cordova, 16th March 1453. He served with great distinction first in the war with the Moors of Granada, and afterwards in the Portuguese campaign. At the close of the final contest with Gianada he concluded the negotiation with Boabdil (Abu Abdallah), king of the Moors, in such a masterly manner that the rulers of Spain bestowed npon him a pension and a large estate in the conquered territory. He was next sent to the assistance of Ferdinand II., king of Naples, against the French. In less than a year Gonsalvo, with his limited resources, had conquered the greater part of the kingdom of Naples, and obtained the appellation of 'El Gran Capitan.' In conjunction with King Ferdinand he succeeded in completely expelling the French from Italy; and in August 1498

he returned to Spain, having received as reward for his valuable services an estate in the Abruzzi, When the with the title of Duke of San Angelo. partition of the kingdom of Naples was determined partition of the kingdom of Naples was determined upon by a compact entered into at Granada, 11th November 1500, Gonsalva again set out for Italy with a body of 4300 men, but first took Zante and Cephalonia from the Turks, and restored them to the Venetians. He then landed in Sicily, occupied Naples and Calabria, and demanded from the Event state in confidence with the granular compact. the French that, in compliance with the compact, they should yield up Capitanata and Basilicata.
This demand being rejected, a war broke ont between the two belligerent powers, which was waged with varied success. After the victory of Capacha in April 1702 Capacha took power with Cerignola, in April 1503, Gonsalvo took possossion of Calabria, the Abruzzi, Aprilia, even the city of Naples itself, and then laid siege to Gaeta, but was forced to retreat before a superior force of the enemy. On the 29th December of the same year, enemy. On the 29th December or one sent the however, he fell upon them unexpectedly near the Garigliano, and obtained a complete victory. French army was almost annihilated; the fortress of Gacta fell; and the possession of Naples was or Gacta tell; and the possession of Naples was seemed to the Spaniards. King Ferdinand of Spain bestowed the duchy of Sean apon the conqueror, and appointed him viceray of Naples, with unlimited authority. His good-fortane, however, made him many powerful enemies; and Gonsalvo was recalled to Spain, where the king treated him with marked neglect. Gonsalvo now betook himself to his estates in Granada, and on the 2d December 1997. self to his estates in Granada, and on the 2d December 1515 he died at Granada. See Prescoti's History of Ferdinand and Isabella (3 vols. Boston, 1838).

Gonzaga, the name of a princely family of German origin, from which sprang a long line of sovereign dukes of Mantha and Montferrat. The sway of this race over Mantha extended over a period of three centuries, and many of its members were magnificent promoters and cultivators of arts, science, and literature. The Gonzagas gradually monopolised all the chief posts of command, both civil and military; in 1432 they were invested with the title and jurisdiction of hereditary marquises, and in 1530 with that of dukes or severeigns of the state. After their clevation to ducal dignity they were the faithful champions of the impering interests in their policy with other states. The Honse of Gonzaga and that of the Visconti Dukes of Milan were perpetually at war (see Manyux). The marquisate was granted to Giovanni Francesco in 1433. The tenth and last Duke of Mantha, Ferdinando Carlo, who had countenanced the French in the War of the Succession, was deprived by the Emperor Joseph I. of his states, and placed under the han of the cupire. He died in exile in 1708, leaving no issue.—A branch of the family ruled Guastalla till 1746.

Gonzaga, Luigi, known as St Aloysius, was born in the castle of Castiglione, near Brescia, 9th March 1568, and was educated at Florence, Mantua, and Rome. Renouncing his marquisate of Castiglione in favour of his brother, he entered the Society of Jesus in 1585. At Rome during a visitation of the plague he gave himself up with wonderful self-devotion to the care of the sick; and, stricken by the malady, died 21st June 1591. He was beatified in 1621, and canonised in 1726. See the Life of St Aloysius Gonzaga, edited by E. H. Thompson (1867); the large Life in Italian by Cepari; and Aubrey de Vere's Essays (1888).

Good, John Mason, physician and writer, was born May 25, 1764, at Epping in Essox, where his father was an Independent uninister. He was apprenticed to a surgeon-apothecary at Gosport, next continued his medical studies in London, and

commenced practice as a surgeon in Sudbury in 1784. Money difficulties drove him to London in 1793, where he combined medicine with the most miscellaneous literary activity. In 1820 he took his M.D. degree at Marischal College, Aberdeen, and died January 2, 1827. Good's writings embrace poems, translations of Joh, the Song of Songs, and Lucretins, essays on prisons, medical technology, and the history of medicine. He collaborated with Dr Olinthus Gregory and Newton Bosworth in the Pantalogia or Encyclopædia, comprising a General Dictionary of Arits, Sciences, and General Literature, in twelve volumes, which was completed in 1813. His ambitions poem, The Book of Nature, was published in 1826.

Goodall, Frederick, an English artist, the son of Edward Goodall (1795-1870), an engraver, who early encouraged his son's artistic talouts, was born in London, September 17, 1822. He was only seventeen years of age when he exhibited his first picture at the Royal Academy, 'French Soldiers playing Cards in a Cabaret,' 'The Return from a Christening,' which received a prize of 450 from the British Institution, 'Thied Soldier' (1842), 'Village Festival' (1847), 'Hunt the Slipper' (1849), 'Raising the Maypole' (1851), and 'Cranmer at the Traitors' (ate' (1856) are amongst the best of his early pictures. A visit to Venice and Egypt in 1857-59 led him to turn his attention to Italian and oriental subjects, such as 'Reciting Tasso' (1859), 'Song of the Nubian Slave' (1844), 'Rising of the Nile' (1865), 'Muter Dolorosa' (1868), 'Sheep-washing near the Pyramids of Gzeh' (1876), 'Daughters of Laban' (1878), 'Return from Mecca' (1881), 'Flight into Egypt' (1885), and muncrons others. Goodall was elected a Royal Academician in 1863.

Good-conduct Pay is an addition to ordinary pay, granted to privates, lance corporals, and acting bombardiers of the British army. To carn one penny a day the soldier must have served two years without his name having appeared in the regimental defaulters' book, in which serions crimes are recorded. For a second penny six years' service is requisite, and the soldier funst have held the first penny for two years without an entry in the regimental defaulters' back—called a 'term of good conduct.' A third penny can similarly be carned after twelve years service, a fourth after eight our and address after region, of five years. eighteen, and others after periods of five years. Each penny curries with it a hadge or Chevron (q.v.) to be worn on the left sleave. A special rule enables a man who has served without an entry for 14 years continuously to obtain his fourth entry for 14 years continuously to ontain its ionian and succeeding badges and good-conduct pay two years sooner than he otherwise would do. One badge and the pay attached to it is forfeited for every entry in the regimental defaulters' book, but may be reguined by a 'half-term of good conduct' (one year) for each badge lost. A soldier who deserts, or is sentenced by court-martial to round servitude or to be dischurged, or by a civil penal servitude or to be discharged, or by a civil court to imprisonment exceeding six months, forfeits, as a result of the sentence, all his badges and good-conduct pay; and a court-martial may specially sentence him to this forfeiture for any offence. Sergeants and full corporals or homhardiers when reduced to the ranks are allotted the good-conduct pay and hadges, less one, which their service would have outitled them to if they had not been promoted, though none is granted to them while non-commissioned officers. Sergeants of distinguished or meritorious servico, however, are granted amuities, not over £20 each, receivable during active service, and also on retirement, together with a silver medal inscribed 'for moritorious service,' or 'for distinguished conduct in the field.'—In the navy very similar rules govern the issue of good-conduct pay, but its amount is limited to threepence a day, and petty officers may hold it. In the United States the pay of private soldiers increases from \$13 to \$18 per month according to

In the United States the pay of private soldiers increases from \$13 to \$18 per month according to length of service; and the pay of officers in active service, from chaplain to colonel, increases by 10 per cent. for every five years' service till the completion of twenty years' service.

Goodeniaceæ, an order of corolliforal dicotyledons, closely allied to Campanulaceæ and Lobeliaccæ. The 200 species, the great part herbs, are mostly natives of the Australian and South African regions. Goodenia ovata is a pretty yellow-llowered shrub of Australia. Scavola Taccada is a shrub from the pith of which the Malays make a kind of rice-paper. The young leaves are eaten as a salad.

Good Friday, the name applied by the Roman Catholic and Anglican Church to the Friday before Catholic and Anghean Church to the Friday before Easter, sacred as commemorating the crucifixion of our Lord; paraskeuē, Holy Friday, or Friday in Holy Week, was its general appellation. This day was kept as a day of mourning, of rigid fast, and of special prayer from a very early period. It was one of the two paschal days celebrated by the Christian church, and in memory of the crucifixion was called by the Gracks Pascha Staupicinan or was called by the Greeks Pascha Staurösimon, or the 'Pasch of the Cross.' In the Catholie Church the service of this day is very peculiar: instead of the ordinary mass, it consists of what is called the Mass of the Pre-sanctified, the sacred host not being consecrated on Good Friday, but reserved from the preceding day. Formerly all the faithful partook in silence of the cucharist, but at present communion is forbidden on Good Friday, except in the case of the celebrant and of sick persons. The priests and attendants are vested in black; the altar remains stripped of its ornaments, as on Holy Thursday; a wooden clapper is substituted for the bell at the elevation of the host; the priest recites a series of prayers for all classes, orders, and ranks in the church, and even for heretics, pagans, and Jews, though the ministers' genulexion is omitted before this last petition, in dotestation of the feigned obeisance with which the Jews mocked Christ. But the most striking part of the core-monial of Good Friday is the so-called 'adoration of the cross,' or, as it was called in the Old English popular vocabulary, 'creeping to the cross.' The black covering is removed from a large crucifix which is placed before the altar, and the entire contraction with the contraction of the cross, or, as it was called in the Old English popular vocable of the cross, or, as it was called in the Old English popular vocable of the cross, or, as it was called in the Old English popular vocabulary, 'creeping to the cross.' The gregation, commencing with the celebrant priest and his ministers, approach, and upon their knees reverently kiss the figure of our crucified Lord. In the eyes of Protestants this ceremony appears to partake more strongly of the idolatrous character than any other in the Roman Catholic ritual; but Catholics earnestly repudiate all such construction of the cornerus (control Line) Energy (con Catholics earnestly repudiate all such construc-tion of the ceremony (see IDOLATRY, IMAGES). The very striking office of Tenebra ('darkness') is held upon Good Friday, as well as on the preceding two days: it consists of the matins and lands of the following day, and has this peculiarity, that by the close all the lights in the church have been gradually extinguished except one, which for a time (as a symbol of our Lord's death and burial) is hidden at the Epistle corner of the altar. In the Anglican Church also Good Friday is cele-

In the Anglican Church also Good Friday is celebrated with special solemnity: proper psalms are appointed, and one of the three special collects is a prayer for 'all Jews, Turks, heretics, and infidels.' In some ritualistic churches the *improperia*, or 'reproaches,' adopted from the Roman service, are sung; and Bach's Passion music is frequently heard. In England and Ireland Good Friday is by law a dies non, and all business is suspended;

but this is not the case in Scotland or the United States. In Scotland the day until recently met with no peculiar attention, except from members of the Episcopal and Roman Catholic communions; but of lateycars there have been services in some Presbyterian churches in the larger towns. See also CROSS-BUNS, and CRAMP-RINGS.

Good Hope. See CAPE OF GOOD HOPE.

Goodrich, Samuel Griswold, an American author, best known by his pen-name, Peter Parley, was born in Ridgefield, Connecticut, 19th Angust 1793, and edited in Boston an annual called The Token from 1828 to 1842, to which he contributed poems, tales, and essays, and in which the best of Hawthorne's 'Twice-told Tales' first appeared. He published some two hundred volumes, mostly for the young, and dealing with history, geography, travels, and natural history. Many of his books were reprinted, and became popular in Great Britain. He died 9th May 1860. See his Recollections of a Lifetime (2 vols. New York, 1857).

Goodsir, John, anatomist, was born in 1814, at Anstruther in Fife, studied arts at St Andrews University, and was next apprenticed to a dentist in Edinburgh, attending the medical classes there the while. In 1839 he published a staiking essay on the teeth, and next year became keeper of the Museum of the Royal College of Surgeons in Edinburgh, where he lectured on the diseases of bone and cartilage (1842-43). He also investigated the minute structure of the healthy tissues, and was one of the first observers who strongly insisted on the importance, throughout the animal textures, of the cell as a centre of nutrition. His important memoirs on Secreting Structures and on the Human Placenta, and many of his papers in comparative anatomy and natural history, are still of value. Of these a volume was issued in 1845. In 1844 Goodsir was appointed assistant to Dr Monro, professor of Anatomy in the university of Edinburgh, and two years later became his successor. Here he maintained a wide reputation as an anatomical teacher. Ill-health overtook him near the close of his life, and he died 6th March 1867. See the Memoir by Professor Turner (1868).

Good Templars, a temperance society founded in the United States in 1852 and introduced into England in 1868. Their organisation is largely modelled on that of the Freemasons, total abstinence principles being furthered by means of lodges, pass-words, grips, and insignia. See TEMPERANCE.

Good-will, when used as a legal term, has two meanings, which have been conveniently distinguished as personal and local good-will. Personal good-will is that interest which is sold along with a profession, and is transferable from one person to another by the recommendation of the seller, and his agreement not to compete with the buyer, as when a doctor or a dentist sells his practice. Local good-will is the saleable interest which attaches to a particular business at a particular place, or, as Lord Eldon defined it, 'the chance that the old customers will resort to the old place,' without the further advantage of personal stipulations with the seller, as in the sale of such a business as 'The Railway Hotel,' 'The Market Shop.' When an old lusiness is transferred the possession of the premises and the old stock (which is necessary to the acquirement of the good-will) is usually regulated by special agreement, and what goes as good-will is the right to carry on the old business, to represent that it is the old business that is earlied on, to use the trade name and the trademark, and to benefit by the covenants made by the previous owner for the protection of his business.

In a strict view there is no such thing as a transferable good-will of so personal a business as a medical, legal, or other professional practice. In the sale of these there ought therefore always to be a stipulation that the seller shall not compete with the luyer by practising in the same locality, or that he shall retire from practice; and that the seller shall introduce and recommend the buyer to his connection as his qualified successor. At first such a covenant was sought to be set aside as invalid, on the ground that it tended to restrain the natural liberty of trade; but the courts have now firmly established that, if a definite radius of moderate length is fixed upon, it does not sensibly restrain trade, inasmuch as the person covenanting can go beyond those limits, and trade as much as he pleases. If the party breaks his covenant he is liable to an action for damages. See Charles E. Allan, The Law relating to Good-will (1889).

Goodwin Sands, famous sandbanks stretching about 10 miles in a NE, and SW, direction at an average distance of 51 miles from the east coast of Kent. Large level patches of sand are left dry when the tide recedes, and afford a tirm foothold, so that cricket has often been played upon them. so that ericket has often been played upon them. When covered the saids are shifting, and may be moved by the prevailing tide to such an extent as to considerably change the form of the shoal. The general outline, however, has been fairly constant, although the survey of 1885 by Staff-commander Tizard, R. N., has demonstrated a tendency to more important motion than usual. The shoal is divided into two principal parts, called the North Goodwin and the South Goodwin respectively, between which is the deep inlet named Trinity Bay, where three steamships have been peacefully anchored at one time. In 1841 it was proposed by W. Bush, C.E., and J. D. Paine, architect, to build a harbour of refuge on the Goodwin Sands by enclosing Trinity Bay with a solid wall of masonry, having a large iron lighthouse at the entrance. The North Goodwin is of irregular somicircular shape, with the curved boundary on its northern or outer edge. The North Sand Head light-vessel is moored a little to the eastward of its northern extreme, a little to the eastward of its northern extreme, exhibits a white flash light, and is about 7 miles distant from Ramsgate. So far back as 1795 a lightship, showing three lights, was moored to the north-east of this shoal. The South Goodwin is in shape somewhat like a crab's claw with its lower part fully extended. The South Sand Head lightexhibits a double-flash white light. On the western side rides the Gull Stream lightship, displaying a white revolving light. A fourth lightship, known as the East Goodwin, lies 1½ mile to the castward of the sands, and exhibits a green revolving light. Passing ships not infrequently foul these lightships, notwithstanding the penalty of £50 and expenses to which they become liable. On 30th November 1878 no fewer than three unknown ships in succession ran into the East Coodmitted Lightships in Succession for the East Coodmit Lightships in Succession for the East Coodmit Lightships in Succession Fall into the win lightship. All four of the lights are visible 10 miles in clear weather. Each vessel is painted red, has her name in bold letters on both sides, and is otherwise distinguished by the disposition of her mast or masts. In foggy weather a fog siren is sounded on the South Sand Head lightship, and gongs are beaten on board the other three. Should a ship be observed standing into danger, warning guns are fired without delay. The Good-win Sands are also marked by nine bnoys moored in well-defined positions around them, and distinguishable from one another by their various colours and shapes. One, the north-east Goodwin bnoy, is a Courtenay's self-acting whistle buoy. This admirable system of lightships and buoys has robbed the Goodwins of much of their danger.

These sands have always been dangerous to vessels passing through the Straits of Dover, On the other hand, they serve as a breakwater to form a secure anchorage in the Downs (q.v.) when easterly or sonth-easterly winds are blowing. The Downs, though safe under these circumstances, become dangerons when the wind blows strongly off-shore, at which time ships are apt to drag their anchors, and to strand upon the perfidions Goodwins. As a rule, wrecks are soon swallowed up by the greedy sands. One ship, the Ogle Castle, of 1000 tons burden, entirely disappeared in an hour. In May 1841, however, the ship Ellison remained ashore on the North Goodwin for nineteen consecutive tides, and was got off only slightly damaged. The timbers of another wreck were exposed to view at intervals for forty years. Many colebrated wrecks have taken place here, the most terrible having been the loss of an entire flect of thirteen men-of-war, during the 'great storm' on the night of the 26th of November 1703, on the Sands and neighbouring shore. In two of these, the Mary and the Restoration, every soul perished. Admiral Beaumont with 1200 officers and men were lost. Many poor wretches got on to the Goodwins when the tide was ont, and were seen from the shore. Mr T. Powell, the then mayor of Deal, seized the custom-house boats, and paid five shillings for every man saved. pade two suffilings for every man saved. Over two hundred were rescriced who would certainly have been overwhelmed by the rising tide. In December 1805 here foundered the Aurora, a transport, when no fewer than three hundred persons perished; in December 1814 the British Queen, an Ostend packet, was lost with all hands; and in January 1857 the mail-steamor Violet was decreased. destroyed.

These dangerous sands are said to have once been a law fertile island called Lomea (Infra Insula of the Romans), belonging to Earl Godwin, where he lived and kept his fleets; lmt in 1014, and again in 1090, it was overwhelmed by a sudden inmudation of the sea, which also did great damage in other parts of Europe. The tale is that at the period of the Conquest by William of Normandy these estates were taken from Earl Godwin's son, and hestowed upon the abbey of St Angustine at Canterbury. The albot, having diverted the funds with which it should have been maintained to the building of Tenterden steeple, allowed the seawall to fall into a dilapidated condition; and so, in the year 1090, the waves rushed in, and overwholmed the whole. Tenterden, it should be noted, is an inland place near the south-west frontier of Kent, 15 miles NNE. of Hastings. Thus 'Tenterden steeple was the cause of the Goodwin Sands;' so, at least, says one of the many legends connected with these remarkable shoals. But geology indicates a date long auterior to the eatastrophe of the legend.

Difficulty is experienced in finding firm anchorage for the lightships; and all efforts to establish a lightbonse have been hitherto musucessful. In 1840 a beacon, having a refuge-gallery at its summit eapable of containing forty people, was creeted by Captain Bullock, R.N., which stood for some years, and another in 1847 on piles of iron serowed into the sand, on Dr Pott's method, but this was washed away two months afterwards. As soon as a vessel is known to have been driven upon the sands, signal tockets are thrown up and guns fired from the lightships, when one or more of the four lifeboats from Runnsgate, Deal, Walmer, or Kingsdown immediately hunch to the rescue, followed usually by 'hovellers' boats. These 'hovellers,' as the pilots and boatmen of the Cinque Ports are called, show, in seasons of tempest and danger, an intrepidity which is worthy

of all praise. See Gattie, Memorials of the Goodwin Sands (1889).

Goodwood, the seat of the Duke of Richmond, 3½ miles NE. of Chichester. An 18th-century building by Chambers and Wyatt, it has a notable collection of portraits; and its park is famous for its cedars and other trees, which in 1754 included 'thirty different kinds of oaks and 400 different American trees and shrubs' (Bishop Poeoek's Travels through England, Camden Society, 1889). Here is the picturesque racecourse, where the famous Goodwood meeting is held at the end of July, at the close of the London season. It was established in 1802; but its importance (since 1825) was due to Lord George Bentinck's exertious.

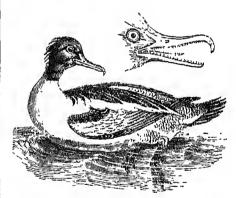
Goodyear, Charles, an American inventor, was born 29th December 1800, at New Haven, Connecticut. He failed as an iron-manufacturer in 1830, but in 1834 turned his attention to india-rubber, the manufactured products of which had hitherto proved failures because of their liability to soften in the heat of summer. Amid poverty and ridicule, sometimes in prison for debt, he patiently pursued the experiments which, after he had obtained a fresh idea from his assistant Hayward's use of sulphur, ended, in 1844, in the issue of his patent for vulcanised rubber (see India-Rubber). This process he afterwards perfected, discovering new uses to which his product could be applied, until it required sixty patents to socure his inventions. He received medals at London (1851) and Paris (1855), as well as the cross of the Legion of Honou; although kept in continual litigation and consequent poverty by shameless infringements of his rights, he yet lived 'to see his material applied to nearly five hundred uses, and to give employment, in England, France, Germany, and the United States, to 60,000 persons' (Parton). He died at New York, July 1, 1860. See Pierce, Trials of an Inventor (New York, 1866); and Parton, Famous Americans of Recent Times (Boston, 1867).

Googe, Barnaby, poet, was born about 1540 at Alvingham, in Lincolnshire, studied both at Christ's College, Cambridge, and at New College, Oxford, then travelled on the Continent, joining on his return the household of his relative Sir William Cecil, and becoming one of the gentlemen-pensioners of Queen Elizabeth. He died about the close of the century. He was a friend of George Turberville, and resembled, without equalling, him in the manner of his translations and the metres of his poems. His best works are a series of eight eclogues and his Capido Conquered, which it is not unlikely that Spenser may have seen. A collection of his Eclogues, Epitaplis, and Sonnets was published by Edward Arber in 1871.

Goole, a town and river-port in the West Riding of Yorkshire, is situated at the junction of the Orsc with the Don, 22 miles SSE of York. The town has since 1829 grown rapidly, and now ranks amongst the chief ports of the kingdom. It possesses extensive docks, which are annually entered and cleared by some 4600 vessels of more than 1,100,000 tons burden. The annual value of the imports amounts to about 44 millions sterling, and that of the exports to more than 44 millions. Amongst the imports are shoddy for manufacturing purposes, oil, logwood, timber, champagne, farm-produce, and groeeries. Coal, eloth, and machinery are amongst the chief exports. There are iron-foundries, alum, sngar, and cordage manufactories, ship and boat building yards, and establishments for sail-making and agricultural machine-making. Pop. (1851) 4722; (1881) 10,418.

Goorkhas, or Gurkhas, the dominant race in Nepal, descended from Hindu immigrants and claiming a Rajput origin, overran the Khatmandu valley, and extended their power over Nepal (1767-68). Their advance southward led to the Nepal or Goorkha war of 1814-15, and General Ochterlony's spirited campaign brought about the treaty of Seganli, which still defines English relations with Nepal, and which ceded various tracts in the Hinalayas. The Goorkhas, who are a short, thick-set race, are brave and faithful soldiers, and lent valuable aid to the British in the suppression of the Mutiny and subsequently.—The village of Goorkha, or Gurkha, stands about 53 miles from Khatmandu, the present capital of Nepal. It was folimerly the chief town. See Nepal.

Goosander (Mergus mergunser), a web-footed bird in the duck family (Anatidæ), in the same genns as the Mergansers, of which it is the largest British representative. The adult male, which measures 26 inches in length, has the head and upper part of the neck of a rich shining green, the feathers of the crown and back of the head elongated, the back black and gray, the wings black and white, the breast and belly of a delicate reddish-buff colour. The bill, legs, and feet are orange-red. The female, which is rather smaller, has the head reddish-brown, with a less decided taff than the male, and much grayer plunage. The edges of the bill are saw-like above and below, being covered with numerous sharp tooth-like projections directed backwards. The goosander is a native of the Arctic regions, extending into the temperate parts of Europe, Asia, and America.



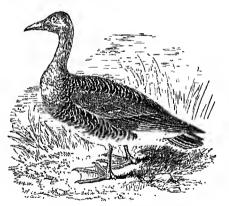
Goosander (Mergus merganser).

In the southern parts of Britain it is seen only in winter, and then only in severe weather, the females and young nigrating southwards more frequently than the old males, and not unfrequently appearing in small flocks in the south of Scotland and north of England. In some of the estumics and fresh-water lakes in the northorn parts of Scotland it spends the whole year. It usually nests under a ledge of rock, in the hollow trunk of a tree, or under the shelter of the twisted roots, and lays, about the end of April, eight to thirteen ereamy-white eggs. It feeds almost entirely on living fish, which its serrated bill and its power of diving admirably adapt it for catching. The flesh of the goosander is extremely rank and coarse.

Goose (Anser), a genus of web-footed birds belonging to the duck family (Anatidæ). The bill is rather high at the base and not longer than the head; the upper part of the beak is slightly looked, and the lamelle, characteristic of all the duck tribe, are short, tooth-like, and altogether adapted to

cropping the grass and other herbage on which the geese chiefly feed. The feet are short and completely webbed; the hind-toe is present; and the legs are placed comparatively far forward, so that the movements on land are less awkward than those of most ducks. Geese swim little, and never dive. When migrating, or on other long flights, they usually fly in a donble line, converging to form a more or less perfect wedge, led by a single gander. The genus is represented by over a dozen species occurring throughout the palrearctic and nearctic regions. Only one species is certainly known to nest in Britain—the Gray Laggoose (A. cinereus)—from which our common domestic goose is believed to be descended. This species need to breed abundantly in the fen districts of England, but has become very rare since the drainage of these parts. It still breeds, though not commonly, in the northern counties of Sectland and in the Hebrides, and large flocks are seen in winter in some of the central counties of Ireland. The nest is placed among heather or on a ledge of rock, and is made of reeds, moss, or grasses. The eggs, usually five to six in unmber, are surrounded by down placked by the female from her own breast. The length of the adult male is about 35 inches; of the female, 30 inches; the plumage is grayish-brown on the upper parts, bhish-gray on the wing-coverts, dull white with black markings on the under parts; the feet, legs, and bill are flesh-coloured, and the nail at the tip of the bill is white. This last characteristic is shared by a smaller species, the White-fronted or Laughing Goose (A. albifrons), and by it these two may be readily distinguished from the other two common species which have the nail black. The white-fronted goose arrives in Britain every winter in large flocks as soon as severe weather sets in on the Continent. The male measures 27 inches; the prevailing colour is brown. The Bean Goose (A. brachyrhyneus) are closely-allied species,

298



Bean Goose (Anas segetum).

common in many parts of the country from autumn till late in spring. The bean goose is said to exhibit a fondness for newly-sown beans, among which it causes considerable havoc. Its plumage is darker than that of the preceding species; its length is 34 inches. It is readily domesticated. The smaller pink-footed goose has the legs and feet of a pink colour; the bill pink above, black at the hase and edges; the nail, as in the bean goose, black.

A great rarity in Britain is the white North American Snow Goose (*Chen hyperborous*), which is found all over North America, but breeds in the far north. The Canada Goose (Bernicla canadensis), found all over North America (where it is the commonest wild goose), is partially domesticated in Enrope, where it breeds freely. Among the sea-geese the genus Bernicla, represented by our Barnacle Goose (q.v.) and Brent Goose (q.v.), must especially be noted. In other genera there are many interesting forms which can only be mentioned. The Egyptian or Nile Goose (Alopochen acyptiaca), which is often seen figured on Egyptian monuments, was the 'fox-goose' or 'chenalopex' of the Greeks, so called perhaps on account of the burrows in which it breeds or the fox-like colour of part of its plumage. It is frequently kept in confinement, and finds its nearest relative in the Orinoco Goose (Alopochen jubuta) of north-east South America. Notable also is the African Spur-winged Goose (Plectropterns), in which the corner of the wing bears a strong spur. Very unique, with sharply-clawed and only slightly webbed toes is the Semi-pahmate Goose (Anstralia and anatomy suggests a crane. Also Australian and vory peculiar is the sluggish and heavy, thick-billed Cape Barren Goose (Cercopsis nove holtendier), rapidly becoming scarce (see Cereopsis). Finally this last form leads us to the yet more remote Chemiorois, which formerly inhabited New Zealand, but having wholly lost the power of flight naturally became extinct.

Although the common gaose has been long domesticated, and was probably among the very first of domesticated birds, the varieties do not differ widely from each other. Emden Geese are remarkable for their perfect whiteness, Toulouse Geese for their large size. As a domesticated bird the goose is of great value, both for the table and on account of its quills and fine soft feathers. The quills supplied all Europe with pens before steel pens were invented, and have not ceased to be in great demand. Geese must have free access to water, and when this is the case they are easily reared and rendered profitable. Two broads are sometimes produced in a season, ten or eleven in a broad, and the young geese are ready for the table three months after they have left the shell. They live, if permitted, to a great age. Willinghly records an instance of one that reached the age of eighty years, and was killed at last for its misculievousness. Great flocks of geese are kept in some places in England, particularly in Lincohshire, and regularly plucked five times a year for feathers and quills. Geese intended for the table are commonly shut up for a few weeks, and fattened before being killed. Great mumbers are imported from Holland and Germany for the London market, and fattened in England in establishments entirely devoted to this purpose. Michaelmas is the great goose season. Geosc-hams are an esteemed delicacy. The gizzards, heads, and legs of geese are also sold in sets, under the name of giblets, to be used for pies. The livors of geese have long been in request among opicures both ancient and modern. The patte de foic gras of Strasburg is made from livers in a state of morbid enlargement, cansed by keeping the geese in an apartment of very high temperature. See Barnacle.

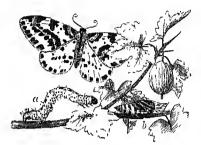
Gooseberry (Grossularia), a sub-genus of Ribes (see Currant), distinguished by a thorny stem, a more or less bell-shaped calyx and flowers on 1-3-flowered stalks. The common gooseberry (Ribes Grossularia) is a native of many parts of Europe and the north of Asia, grawing wild in rocky situations and in thickets, particularly in mountainous districts; but it is a doubtful native of Britain, although now to be seen in hedges and thickets almost everywhere. There are three main

varieties, formerly regarded as distinct species: (1) R. Grossalaria, now merely var. pubescens, in which the hairs are glandular and cover the berries; (2) var. uva-crispa, in which the hairs are non-glandular, and fall off the berries before ripening; (3) var. reclinatum, in which hairs are found only on the leaf-margins. The varieties produced by enlivation are very numerons, chiefly in England, where, and particularly in Lancashire, the greatest attention has been paid to the enlivation of this valuable fruit-shrub. In the sonth of Europe it is little known. It does not appear to have been known to the ancients. Its cultivation cannot be certainly referred to an earlier date than the 17th century, and was only in its infancy at the middle of the 18th, when the largest gooseberries produced in Lancashire scarcely weighed more than \(\frac{1}{2} \) oz., whereas prize gooseberries now sometimes reach 2 oz. Many well-known diversities of form, colour, and flavour, as well as of size, mark the different varieties. For the production of new varieties the gooseberry is propagated by seed; otherwise, generally by cuttings, which grow very freely. Any good garden soil suits the gooseberry. It is rather the better for a little shade, but suffers from much. The bushes are trained in various ways, but it is necessary to prune so that they may not be choked up with shoots; yet care ought to be taken to have an abundant supply of young wood, which produces the largest berries. Summer rather than winter pruning is now largely recommended. Besides its well-known wholesomeness and pleasantness, and its use for making an excellent preserve and jelly, the ripe fruit is used for making wine and vinegar. An effervescent gooseberry wine, which might well claim attention under its own name, is often fraudulently sold as champagne. The use of unripe gooseberries for turts increases the value of this fruit-shrub. The gooseberries may be kept in jars or bottles, which are closely seuled while heated to expel air, and placed in a co

Various derivations have been given of the name gooseberry, but most probably the first syllable is a corruption of groscille, the French name of the fruit, from which also comes the Scotch grozet or grozart. Attempts to introduce the European gooseberry into North America have invariably failed, owing to the appearance, sooner or later, of mildew among the plants. Among the other species or varieties most worthy of notice are R. oxyacauthoides, extending across the upper North American continent from the Atlantic to the Pacific, and now largely grown for market in the middle states; R. divaricatum and R. irriguum, both of north-west America—all agreeable, though small and more or less acid; R. gracile, found in mountain-meadows from New York to Virginia, with blue or purplish berries of exquisite flavour; R. aciculare, a Siberian species, with sweet, well-flavoured yellowish or purplish smooth berries; all of which, and probably others, seem to deserve more attention than they have yet received from horticulturists.—The Snowy-flowered Gooseberry (R. niveum), a native of America, is remarkable for its beautiful white pendulous flowers. Its berries in size and colour resemble black currants, and make delicious tarts. R. speciosum, from the same region, is very ornamental.—R. saxatile, of Siberia, and other species, forming the sub-genus Botrycarpum, have a character intermediate between currants and gooseberries, being prickly shrubs, but having their berries in racemes.—The so-called Cape or Peruvian Gooseberry (Physalis)

is a Physalis (q.v.). For the Coromandel Gooseberry, see CARAMBOLA.

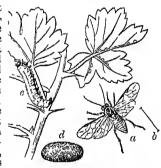
Gooseberry Caterpillar, a name applied to the larvie of two very different insects, both injurious to gooseberry and current bushes. (1) The Magnie Moth (Abracas grossulariata), appearing about midsummer, has usually a black head, yellow



The Magpie Moth (Abraxas grossulariata):
a, caterpilar; b, chrysalis,

body, and white wings spotted with black. From eggs laid on the leaves of the above-mentioned bushes caterpillars hatch in September, feed for a brief space, and then hide themselves till May or June of the next year. The eaterpillar is a 'looper,' drawing itself up into a peculiar curve when alarmed, and has a black head, creamy body with some stripes of reddish-orange along the side and elsewhere, and with a row of black spots along the middle line of the back. After a period of voracity, it spins a transparent cocoon and passes into a ohrysalis, 'yellow at first, but afterwards shining black, with orange-coloured rings.' Care of the bushes, syringing with various washes, and gathering the torpid caterpillars are the usual means of prevention and remedy. (2) More destructive than the above is the larva of the Gooseberry Sawfly (Nematus rebesil), which plays have with the leaves of our bushes. The female saw-

lly appears about April and lays her eggs on the leaves. The grubs hatch in a week or less, and eat small round holes first in the leaf on which they are born, then all over the bush. The adult fly is a yellowish insect with transparent wings, and measures an inch in length. The larva is



about a third of Gooseberry Sawfly (Nematus ribesii); an inch in length. a, adult fly; b, natural size; c, larva; The larva is d, pupa.

bluish-green, with black head, fect, tail, and spots, with twenty feet, and a length of about three-fourths of an inch when full grown. At muturity they drop from the bushes, and bury themselves in the ground to undergo their metamorphoses. The grubs of late summer broods remain as such, but within eccoons, throughout winter, finishing their metamorphoses as the gooseberry bushes are becoming leafy in spring. Miss Ornerod recommends removing the surface soil in early spring from under the bushes, treatment with lime, picking off attacked leaves, drenching the bush with warm water not hat enough to hurt the leaves, dusting with flour of sulphur, &c. Dusting with

hellebore powder is dangerous to those who may cat the berries from which the poison has not been removed. In regard to both these practically important insects, consult Miss Ormerod's Manual of Injurious Insects (Lond. 1881).

Goose-fish, a common name in America for the Angler-fish (see Angler). The American Goose-fish (Laphins americanus) is one of the best known of the five species of Lophins, grows to a length of 4 to 5 feet, and weighs from 15 to 170 lb. It is dark brown above and dirty white below, is hideous in appearance (being also known as 'wide gab' and 'devil fish'), and has a most voracions appetite, preying indifferently on all kinds of fish, and eating occasionally fowls, such as gulls and ducks. It is practically uscless for any purpose.

Goosegrass. See CLEAVERS.

Gopher, a name in use in some parts of America for various kinds of ground squirrel (see CHIPMUNK), for the Prairie Dog (q.v.), for the Penched Rat (q.v.), and even for the land tortoise of the southern states.

Gopher Wood. The probable identity of the gopher wood of Scripture with the Cypness (q.v.) is maintained partly on account of the qualities of the wood, and partly on account of the agreement of the radical consonants of the names.

Göppingen, a town of Würtemberg, 26 miles by rail ESE of Stattgart, has a 16th-century castle, a mineral spring (alkaline carbonic acid), and carries on manufactures of woollen cloth, paper, toys, &c. Pop. (1875) 9532; (1885) 12,102.

Gopura. See Indian Architecture.

Gorakhpur, capital of a district in the Northwest Provinces of India, on the Rapti, 430 miles NW. of Calentia, with an active trade in grain and timher. Pop. (1881) 57,022.—The flat, well-watered district of Gorakhpur has an area of 4598 sq. m., three-fifths of which is cultivated, and a fourth under forest. Pop. (1872) 2,019,381; (1881) 2,617,120, nine-tentls Hindus.

Gorany, or Gounami (Osphromenus olfue), a fish of the family Anabasidae or Labyrinthi-branchidae, a native of the Eastern Archipelago, highly esteemed for the table, and introduced on that account into India, Mauritins, Cayenne, and the French West India Islands. Its form is deep in proportion to its length, the head small, and terminating in a rather sharp short snont, the month small, the tail rounded, the dorsal and anal fins having numerons rather short spines, the first ray of the ventral fins extending into a very long filament; it attains the size of a large turbot. It is sometiones kept in large jars by the Dutch residents in Java, and fed on water-plants. It was introduced into Mauritius about the middle of the 18th century, and soon spread from the tanks in which it was at first kept into the streams, multiplying abundantly. The goramy is interesting also on other accounts. It is one of the nest-building fishes, and at the breeding season forms its nest by entangling the stems and leaves of aquatic grasses. Both the male and female watch the uest for a menth or more with careful vigilance, and violently drive away every other fish which approaches, till the spawn is hatched, afterwards affording a similar parental protection to the

Gordian Knot. The traditional origin of this famous knot was as follows. The Phrygians, seeking a king, were informed by the oracle at Delphi that they were to choose the first person they met riding on an ox-eart towards the temple of Zens. That person was Gordius, a poor peasant,

who accordingly was elected king. He afterwards dedicated his car and yoke to Zeus, in the acropolis of Gordium (a city named after himself), and tied the knot of the yoke in so skilful a manner that an oracle declared whoever should unloose it would be ruler of all Asia. When Alexander the Great came to Gordium, he cut the knot in two with his sword and applied the prophecy to himself.

Gordianus, the name of three Roman emperors, father, son, and grandson.—The first, MARCUS ANTONIUS CORDIANUS, was descended by the father's side from the famous family of the After being adile, in which capacity he Graechi. celebrated gladiatorial sports with great magnifi-cence, he twice filled the office of consul. On the cenee, he twice fried the other of consin. On the conclusion of his second term of office he was appointed proconsul of Africa. He was a man of modest and gentle manners, great liberality, and refined literary taste. The tyramy and injustice of the Emperor Maximinus at length excited a rebelthe Emperor maximitation of which proclaimed Gordianus emperor, although he was then (238) in big eightieth year. At the same time his son was conjoined with him in the exercise of imperial authority. The younger Gordianus, however, was defeated and slain in battle by Capellianus, viceroy of Manritania, before Carthage, whereupen his father put an end to his own existence, having been emperor for little more than a month.—Marcus Antonius Gordianus, grandson of the preceding, was raised to the diguity of Casar along with Pupienus and Balbinus, who were also elected emperors in opposition to Maximinus; and, in the same year (238), after the three last named had all fallen by the hands of their own soldiers, Gordianus was elevated by the Pretorian bands to the rank of Angustus. Assisted by his father-in-law, Misithens, a man distinguished for his wisdom, virtue, and courage, whom he made profect of the Pretorians, Gordianus marched in 242 into Asia, against the Persians, who under Shahar (Sapor) had taken possession of Mesopotanua and had advanced into Syria. Antioch, which was threat emperor for little more than a month.—Marcus advanced into Syria. Antioch, which was threat-ened by them, was relieved by Gordianus; the Persians were driven back beyond the Enphrates; and Gordianns was just about to march into their country whon Misithens died. Philip the Arabian, who sneceeded Misithens, stirred up the soldiery to assassinate the emperor (244).

Gordins. See HAIR-REL.

Gordon, The Family of. This great Scottish historical house takes its origin and name from the lands of Gordon in Berwickshire. The first traces of it are found in the beginning of the 13th century, when Gordons witnessed charters by the Earls of Dunbar and March, and granted lands and pasturages to the monks of Kelso. In 1805 Sir Adam of Gordon held under King Edward I. of England the office of joint-justiclar of Lothian, and sat at Worthing terror of the content of the co Westminster as one of the representatives of Scotland. He was among the last to join the banner of Bruce, who rewarded his adherence by a grant of the northern lordship of Strathhogic. The grant failed of effect at the time; but it was renewed by King David II. in 1357, and by King Robert II. in 1376. Under this last renewal Sir John of Gordon, the great-grandson of Sir Adam, entered into possession, and so transferred the chief seat of the family from the Merse and Tevioldalo to the banks of the Dee, the Deveron, and the Spey. The direct of the Dee, the Deveron, and the Spey. The direct male line came to an end in his son Sir Adam, who fell at Homildon in 1402, leaving an only daughter to inherit his lands, but transmitting his name through two illegitimate brothers—John of Gordan of Seurdarg, and Thomas of Gordon of Ruthven—to a while circle of the gentry of Mar, Buchan, and Strathbogie, who, calling themselves

GORDON

'Gordons,' styled the descendants of their niece

'Seton-Gordons.

DUKES OF GORDON.-Elizabeth of Gordon, the heiress of Sir Adam, married before 1408 Alexander of Seton (son of Sir William of Seton), who before 1437 was created Lord of Gordon. Their son Alexander, who took the name of Gordon, was made Earl of Huntly in 1445, and Lord of Badenoch a few years afterwards. He acquired by marriage the baronics of Cluny, Aboyne, and Glemmuck in Aberdeenshire; and Aboyne, and Gremmuck in Aberice name; and had grants from the erown of the lordship of Badenoch and other lands in Inverness-shire and Moray. He died in 1470, and was succeeded by his second son George, who had married Annabella, daughter of King James I., and who added to his territories the lands of Schivas in Aberdeenshire, and Boyne, Enzie, and Netherdale in Baufishire. He was chancellor of Scotland from 1498 to 1502, and, dying soon afterwards, was succeeded by his son Alexander, the third earl, who acquired Strathaven (or Strathdoun) in Banfishire, and the Brae of Lochaber in Inverness-shire. He commanded the left wing of the Scotlish canny at Elodden. Dring in 1591 he the Scottish army at Flodden. Dying in 1524, he was succeeded by his grandson George, the fourth earl, who acquired the earldon of Moray, held the offices of lieutenant of the north and chancellor of the realm, and was reputed the wisest, wealthiest, and most powerful subject in Scotland. The erown, connaclled to clip his wings lest he should attempt, like the Douglases in the previous age, to overawe the throne, stripped him of the earldom of Moray, and, rushing into revolt, he was slain at Corrichie in 1502. Sentence of forfeiture was pro-nounced upon his corpse, but it was rescinded in 1507, and his son George succeeded as lifth earl. He died in 1576. His son George, the sixth earl, was conspicuous as the head of the Roman Catholies in Scotland. He defeated at Glenlivet a royal force sent against him under the Earl of Argyll in 1594, but, submitting to the king, obtained an easy pardon, and was made Marquis of Huntly in 1599. He died in 1636. His son George, the second marquis, espoused the royal cause in the great civil war of his time. 'You may take my head from my shoulders,' he said, in answer to tempting offers from the Coven-anters, 'but not my heart from my king.' When he resided in Aberdeen in 1639 he was attended daily by twenty-four gentlemen, of whom three were barons, while eight gentlemen gnarded his mansion by night. He was beheaded at Edinburgh in 1649. His son Lewis, the third marquis, was restored by King Charles II. in 1651, but died in 1653. His son George, the fourth marquis, was created Duke of Gordon in 1684. He held the castle of Edinburgh for King James VII at the Revolution; and, dying in 1716, was succeeded by his son Alexander, the second duke, who died in 1728. He lived, Boswell says, 'in sequestered magnificence, correspond-ing with the grand-dukes of Tuscany,' with whom he believed that he could count kindred. His son Cosmo George, the third duke, died in 1752, leaving three sons. The youngest, Lord George Gordon (q.v.), led the Protestant mob which sacked London in 1780; the eldest, Alexander, who became fourth duke, was the anthor of the well-known song, 'Cauld Kail in Aberdeen.' His wife, the sprightly Jane Maxwell, daughter of Sir William Maxwell of Monreith, was even more noted for her beauty than ber wit, and was known as the 'heautiful Duchess of Gordon' (died 1812). The fourth duke died in 1827, and was succeeded by his son George, the lifth duke, on whose death, without issue, in 1836, the title of Duke of Gordon (heing limited to the heirs-male of the body of the list duke) became extinct, the title of Earl of Huntly fell into abeyance, and the title of Marquis of

Hantly was adjudged to the Earl of Aboyne, as being male of the body of the first marquis. The heir-male of the body of the first marquis. The estates went to the duke's nephew, Charles, fifth Duke of Richmond and Lennox, grandson of the fourth Duke of Gordon. Elizabeth, Duchess of Gordon (1774-1864), widow of the fifth duke, long survived her lunsband, and was a woman of noble character and eminent piety (see her Life and Letters, by A. M. Stuart, 1866). The title of Duke of Gordon was revived in 1876 in the person of the sixth Duke of Richmond.

301

MARQUISES OF HUNTLY.-Lord John Gordon, second son of the first Marquis of Huntly, was made Viscount of Melgnnd and Lord Aboyne in 1627. Three years afterwards he was burned to death in the tower of Frendraught. In 1632 his elder brother George was made Viscount of Aboyne, which title, on his succession to the Marquisate of Huntly in 1636, devolved on his son Lord James, who distinguished himself on the king's side during the wars of the Covenant, and died, it is said, of a broken heart, a few days after the execution of King Charles I. in 1649. His younger brother, Lord Charles Gordon, was made Earl of Aboyne in 1660; and his great-great-condens Coverage and the large of the condens of th grandson, George, who had been a favourite at the court of Marie Antoinette, succeeded as fifth Earl of Aboyne in 1794, on the death of his father, and as until Marquis of Huntly in 1836, on the death of the fifth Duke of Gordon. In 1853 the ninth marquis was succeeded by his eldest son Charles, tenth marquis, who died in 1863, and the marquisate of Hantly and earldom of Alboyne fell to his cldest son Charles, eleventh marquis.

EARLS OF SUTHERLAND.—About the year 1512 Adam Gordon of Aboyne, second son of the second Earl of Huntly, married Elizabeth, the heiress of Sutherland, and was progenitor of the Gordon Earls of Sutherland, who bore the surname of Gordon till the beginning of the 18th century, whon they exchanged it for that of Sutherland, which head least home but the scaling and the surface and second till the beginning of the 18th century.

had been borne by the carlier carls

LOCHINVAR AND KENMURE.—William of Gordon (1306-29), the second son of Sir Adam of Gordon, was the progenitor of the knightly family of Lochinvar, which in 1633 was raised to the peerage by the titles of Lord of Lochinvar and Viscount of Kenname. William, the sixth viscount—the 'Kemmure's on and awa' of Jacobite song—was belieaded in 1716 for his share in the rising of the previous year. The peerage, then forfeited, was restored in 1824, but has been in abeyance since the death of Adam,

the ninth viscount, in 1847.

EARLS OF ABERDEEN .-- According to old tradition this house descends from one of the illegitimate brothers of Sir Adam of Gordon, who was slain at Homildon in 1402. Its first authentic member was Patrick Gordon of Methlie, who died on the banks of the Ythan in 1445. In 1642 its chief, Sir John Gordon of Haddo, was created a baronet of Nova Scotia. He was behended at Edinburgh in 1644, bequeathing the name of 'Haddo's Hole' to one of the aisles of St Giles' Church, which had been his prison. His son, Sir George Gordon of Haddo, became a Lord of Session in 1680, Lord President in 1681, and Lord Chancellor in the following year. He was raised to the peerage in 1682, by the titles of Earl of Aberdeen, Viscount of Formartine, Lord Haddo, Methlic, Tarves, and Kellic. He died in 1720 with the character of being 'a solid statesman, a fine orator, speaking slow but strong.' Some of these lineaments, it has been thought, reappeared, with his love of letters, in his great-great-grandson, the fourth Earl of Aberdeen (q.v.). Among other members of the house of Gordon not mentioned above were Colonel John Gordon, one of the assassins of Wallenstein; Gordon Pasha; and, through his mother, Lord Byron.

302 GORDON

See FOCHABERS. There is a MS. Historiæ Compandium de Origine et Incremento Gordoniæ Familiæ (1545), by an Italian monk, Ferrerius; a MS. Origo et Progressus Familiæ Illustrissimæ Gordoniorum in Scotia, by Gordon of Straloch (died 1661); and histories of the house by William Gordon (1737) and C. A. Gordon (1754). See the more valuable Gencalogie and Pedigree of the Earls of Sutherland (which has much on the Gordons), by Sir Robert Gordon of Gordonstoun (written 1639, published 1813, with continuation).

Gordon, Adam Lindsay, the first of Australian poets, was born at Fayal in the Azores in 1833, the son of a retired army-captain. At twenty he sailed to Adelaide to push his fortune, and tried in turns, but without success, sheep-farming, 'over-landing,' and cattle-driving in South Australia, emerging to light in Melbourne as the best gentleman steeplechuse-rider in the colony. His broken circumstances and religious hopelessness deepened the natural gloom of his temperament, and at length he threw up the struggle, and blew ont his brains at Brighton, a marine suburb of Melbourne, 24th June 1870. He had published in 1867 Sea-spray and Smoke-drift, a very unequal volume, yet containing a few admirable lyries reflecting closely the sombre colour of his life and the passionate despair that at last drove him to the refuge of death. His Ashtarath, a Dromatic Lyric (1867), was an ambitions attempt at a task for which his powers were inadequate, only relieved from absolute failure by the beauty of the lyrics with which it is interspersed. His last volume, Bush Bulleds and Galloping Rhymes, appeared, it is said, on the very day of his unhappy death, with a dedication to Major Whyte-Melville. The opening poem, 'The Sick Stock-rider,' is a marvellously vivid transcript from the bush-life he knew, steeped with the irresistible pathos of reality. 'How we beat the Favourite' is said to be the most popular poem in Australia, and certainly it is the best ballad of the turf in the English tongue, unequalled in its kind for fire and speed.

See A. P. Martin's article in Temple Bar for 1884 (vol. lxx.), Marcus Clarke's introduction to the complete edition of Gordon's poems, and D. B. W. Sladen's Australian

Poets (1888),

Gordon, Charles George ('Gordon Pasha'), was born at Woolwich, 28th January 1833, fourth son of General Gudon, Royal Artillery, by his wife Elizabeth Enderby, and descended from the Gordons of Park, a cadet branch of the House of Huntly. From school at Tannton he passed in 1847 to the Military Academy, Woolwich; in 1852 entered the Royal Engineers; and saw his first active service in the trenches before Sebastopal, where he served from January 1855 to the end of the siege, being once slightly wounded. After the fall of the south side Gordon proceeded to Kinburn, returned again to Schastopol, and was employed in the demolition of the docks and destruction of the forts; and he was subsequently engaged in surveying the new frontier between Turkey and Russia in Europe and Asia. In 1860 he went to China and took part in the capture of Peking and the destruction of the fanons Summer Palace near that city. In 1863 he was appointed to the command of a Chinese force officered by Europeans and Americans, and during that and the following year was engaged almost incessantly against the Taiping rebels in the rich provinces of Cheh-kiang and Chinagsat. In two campaigns he fought thirty-three actions and took numerous walled towns, erushing the formidable rebellion which had so long wasted the fairest provinces of China. This feat of arms achieved in the space of eighteen months, and at a cost of only £200,000, placed the young major of engineers in the foremost rank of the soldiers of his day.

Returning from China in 1865, 'as poor as when he had entered it,' he was appointed to the ordinary engineer duties at Graveseud, where he remained for six years, devoting the greater part of his spare moments to relieving the want and misery of the poor, visiting the sick, teaching, feeding, and clothing the many waits and strays among the destitute boys of the town, and providing employment for them on board ship. In 1872 he quitted Gravescud for Bulgaria, where he remained as commissioner on the Danube for nearly

two years.

At the close of 1873 he accepted employment under Ismail, Khedive of Egypt, and, proceeding to the Sondan, took up the work which Sir Samuel Baker had begnu two years earlier—that of open. ing up the vast regions of the equatorial Nile, and the lakes which recent exploration had discovered. In these distant and unhealthy regions he remained for three years, overcoming by extraordinary energy and resolution all difficulties of nature, hostile man and climate. A chain of posts was established along the Nile; steamers were brought from Egypt in sections, put together above the last rapid, and the navigation of Lake Albert Nyanza successfully accomplished. Underlying all this labour there was in Gordon's mind a purpose beyond gain or exploration. It was the abolition of the slave-trade which heretofore had been the one great object of Sondanese commerce. Discovering that his efforts to suppress this trade must remain musuccessful unless his power extended to the vast plain countries lying west of the Nile basin—Kordofan and Dar-Par-Gordon returned to Egypt and England in 1876.

Going out again in January 1877, he was appointed by the Khedive sole governor of the entire Sondan, with unlimited powers over a region that stretched from the second cataract of the Nile to the Great Lakes, and from the Red Sea to the head-waters of the streams that fall into Lake Tchad. During the next three years he traversed in all directions this vast territory. Now he was settling a frontier dispute territory. Now he was settling a frontier dispute with the Abyssinian fendatories in the east; now swooping down with scanty escorts upon some slave raider or rebellious chieftain in western Dar-Für. For months together he seemed to live on the back of his camel. Neither the numbers of his enomies nor the fiercest sun of terrible deserts could check his energy. His presence, multiplied by incessant toil into twenty times the reality, awed the wild tribes into obedience, and for the first time in its history the Sondan seemed to feel that law and justice were united with government. Early in 1880 all this ceased. Gordon resigned his command. A great change was coming in Lower Egypt, and it was evident that under the new system which was being inaugurated at Cairo there could be no place for such a master. A short risit to India, continued on to the old scene of his first famous enterprise in China, filled up the greater portion of 1880; but the close of the year found Gordon in Ireland intent upon relieving the almost chronic unhappiness of that island. Struck with the terrible scenes of poverty which he witnessed in the south and west of the island, he propounded a scheme of land-law improvement, which, although then not with ridicule or silence, has since been largely made the basis of legislation; but these views did not tend to make their holder acceptable in the eyes of authority, and, to escape the necessity of accepting some insignificant routine appointment at home, Gordon volunteered to take another officer's duty in the Mauritius, where for another year he remained unnoticed and unthought of.

From Mauritius Gordon proceeded to the Cape

GORDON 303

in colonial employment, and finally returned to England in the close of 1882. Almost the whole of the following year was spent by him in Palestine in unbroken quiet and reflection. Early in 1884 he was asked by the British government to proceed once more to the Sondan, where the events which had taken place in Egypt since he quitted it four years before had given rise to a long eatalogue of catastrophe. The Moslem populations had risen in revolt, defeating the armies of Egypt and isolat-ing her garrisons. To remove these garrisons from the Soudan was the primary object of Gordon's unission; that accomplished, he was to proclaim the separation of the country from Egyptian rule. But all this was changed by the hard logic of facts. A month after Gordon reached Khartoum that place was invested by the troops of the Mahdi, the leader of the Soudan revolt. Then began what may truly be called the supremely heroic period of Gordon's life. The world seemed to recognise that a great man was in the throes of a great peril. In an age when merit is rarely found unobtrusive, and when genius is ant to exhibit its light on the house top, Gordon, whose whole life had been one endeavour to depreciate his own merit and to deny himself the glory of his actions, became at once the centre of perhaps the widest attention given in our time to one man. After the siege of Khartoum had lasted five months a relief expedition was organised in England. In September the advance up the Nile began. Early in November the troops entered the Soudan at the Second Cataract, the greater portion of the expedition moving in boats built in England for the passage of the upper enteracts, many of which had never been navigated by any craft. After two months of very advance, labour the advance, crossing the desert from Korti, and finding at the latter place some of Gordon's steamers, arrived in the end of Jamary 1885 in the neighbourhood of Khartoum. It was too late. The place had been taken by the Mahdi two days earlier. Gordon had fallen. One thing, however, tour had lasted five months a relief expedition was rne place had been taken by the albith two days carlier. Gordon had fallen. One thing, however, was gained by the toil and blood of this expedition. It was the journal kept by Gordon during the latter half of the siege. From this journal he stands before us—as in no other way could be have been revealed to us—a wonderful instance of course of the resolution and humility. A man from age, faith, resolution, and humility; a man from whose life and death we gather that, amid all the change of science and system, the mould in which the true hero is cast remains the same.

See Andrew Wilson's Ever Victorious Army (1868); Birkbeck Hill's Gordon in Central Africa (1881); Gordon's own Reflections in Palestine (1884), Last Journals (1885), and Letters to his Sister (1888); and the Lives of him by Hake (The Story of Chinese trodon, 2 vols. 1881–85), Arch. Forbes (1884), by his brother, Sir Henry Gordon (1886), and Sir W. F. Butler (1889).

Gordon, Lord George, leader of the London 'No Popery' riots of 1780, was born in London, 26th December 1751, the third son of the third Duke of Gordon. Leaving Eton, he entered the navy, and rose to the rank of lieutenant, but quitted the service during the American war, in consequence of a dispute with the Admiralty relative to promotion. Elected in 1774 M.P. for the pocket borough of Ludgershall, Wiltshire, he presently attacked both sides with such freedom as to give rise to the saying that there were 'three parties in parliament—the ministry, the opposition, and Lord George Gordon.' Still he displayed considerable talent in debate, and no deficiency of wit or argument. A bill having, in 1778, passed the legislature for the relief of Roman Catholics from certain penalties and disabilities (see Catholic Emancipalities and disabilities (see Catholic Emancipalities), and the Protestant Association of London was, among other societies, formed for the purpose of procuring its repeal, and

in November 1779 Lord George was elected its president. On 2d June 1780 he headed a vast and excited mol of 50,000 persons, who, decked with blue coekades, marched in procession from St George's Fields to the House of Commons to present a petition for the repeal of the measure. Dreadful riots ensued in the metropolis, lasting five days, in the course of which many Catholic chapels and private dwelling-houses, Newgate prison, and the mansion of the chief-justice, Lord Mansfield, were destroyed. The magistrates feared to read the Riot Act, but at length on the 7th, when thirty-six fires were blazing at once, the troops were called out by the king, and everywhere drove the rioters before them, 210 being killed, 248 wounded, and 135 arrested, of whom 21 were afterwards excented. Property to the amount of £180,000 had been destroyed in the riots, a vivid description of which is given in Dickens's Barnaby Rudge. Lord George himself was tried for high-treason; but Erskine's defence got him off on the ground of absence of treasonable design. His subsequent conduct seemed that of a person of unsound mind. Having, in 1786, refused to come forward as a witness in a court of law, he was excommunicated by the Archbishop of Canterbury for contempt. In 1787 he was convicted, on two official informations, for a pauphlet reflecting on the laws and criminal justice of the country, and for publishing a libel on Maric Antoinette and the French ambassador in London. To evade sentence he retired to Holland, but was sent back to England, and apprehended at Birningham. He died in Newgate of fever, 1st November 1793, having latterly become a proselyte to Judaism. There is a vindication of him by Dr Robert Watson (1795).

Gordon, Sir John Watson, Scottish portrait-painter, son of Captain Watson of the royal navy, was born at Edinburgh in 1788. His training in art was got in the studios of his unele, George Watson, and Sir Heury Raeburn. At first he essayed imaginative subjects, but on Raeburn's death in 1823 he stepped into his place as the first portrait-painter of Scotland. Three years later he took the surname of Gordon; in 1850 he was eleeted president of the Royal Scottish Academy and knighted, and in 1851 he became a London Royal Academician. Gordon was as national in his art as it is possible for a portrait-painter to be; and nearly every man of note in Scotland, besides not a few in England, sat to him for their portraits. Among his best-known works may he mentioned 'Sir Walter Scott,' 1Dr Chalmers.' (Earl of Dalhonsic,' 'Sir Alexander Hope,' 'Lord President Hope,' 'Sir Juln Shaw Lefevre,' and 'the Provost of Peterhead.' The last picture gained the gold medal at the French Exhibition of 1855. Gordon was not a distinguished colourist, grays and quiet hues heing predominant in his pictures. He died at Edinburgh, 1st June 1864.

Gordon, Lucie, Lady Duff, a clever writer, was the only child of John Austin, the jurist, and of Sarah Taylor, his wife, and was born in London, 24th Jnne 1821. In 1826 she went with her parents to Germany, whence, after two years' stay, she returned, speaking Gernan like her native language. At Bonlogne in 1834 she met Heine, an acquaintance renewed with tender pathos twenty years later, when Heine was dying at Paris. In 1840 she became the wife of Sir Alexander Duff Gordon. In 1842 she gave to the world the first of her long series of translations from the German, Niebuhr's Gods and Heroes of Greece. This was followed by the Amber Witch, begun 1843; the French in Algiers, published 1845; and Feuerbach's Remarkable Criminal Trials, 1846. In 1849, in conjunction with her lunsband, she translated Ranke's House of

Brandenburg. In 1850 appeared her translation of Wailly's Stella and Vanessa: in 1853 she translated Comtesse d'Arbouville's Village Dactor, and, together with her husband, Ranke's Ferdinand and Maximilian. In the midst of her busy life, alternating between translation work and the choicest society, her health gave way, and she was advised to try the climate of the Cape of Good Hope. Thence, 1861-62, were penned her genial and vivacious Letters from the Cupe. After her return to England in 1862 she the same year visited Egypt for the same year. She died at Cairo on 14th July 1869, and was buried in the cemetery there. Her Letters from Egypt (1863) and Last Letters from Egypt (1875), observant and bright and cheerful, form perhaps her best contribution to literature. See Janet Ross, Three Generations of Englishwomen (1889).

Gordon, Patrick, soldier of fortune, washorn at Easter Anchleuchries, on the coast of Aberdeenshire, 31st March 1635. Brought up by his mother as a Catholic, at sixteen he sailed from Aberdeen to Danzig, and entered the Jesnit college of Braunsberg. His restless temper could not long endure the stillness and austerity of that retreat, and, making his escape from it in 1635, he led for some time an unsettled life, until in 1635 he enlisted under the flag of Sweden, then at war with Poland. During the six years that he took part in the struggle between these two powers he was repeatedly made prisoner, and as often took service with his captors, until again retaken. He had risen to the rank of captain-lientonant, when he resolved to try his fortune next with the ezar, and in 1661 joined the Muscovite standard. Hero his services in disciplining the Russian soldiers gained him rapid promotion—lientenant-colonel in 1662, and colonel in 1665. Hearing that the death of his elder brother had made him 'goodman of Auchleuchries,' he wished to return to Scotland; but there was no escape from the Russian service. The ezar, however, sent binn on a mission to England in 1666. On his return he fell into disgrace; but during 1670-76 he was engaged in subdning the Cossacks in the Ukraine, in 1677 in defending Tschigirin against the Turks and the Tartars. His gallant performance of that duty procured him the rank of major-general. In 1683 he was made lieutenant-general; in 1685 obtained leave to visit England and Scotland. James H. wished him to enter the English service; but it was in vain that he petitioned for leave to quit Russia. In 1688 he was made general, and now began his intinnacy with the Czar Peter, who, in the following year, owed to Gordon's zeal and courage his signal triumph over the conspirators against his throne and life. In 1698 he crushed the revolt of the Strelitzes during the ezar's absence from Russia. On 29th November 1699 he died at Moscow. See Dr Joseph Robertson's edition of Passages from the Diary of

Gordon Bennett, Mount, a mountain seen in Africa by Mr Stanley in 1875. It lies south of Albert Nyanza, a little north of the equator and cast of 30° E. long. It is a truncated cone, probably an extinct crater, and rises 14,000 or 15,000 feet in height. It is sometimes covered with snow. See Ruwenzon.

Gordonia, a genns of Tern-tremiacea. G. Lasianthus, the Loblolly Bay, which covers considerable traces of swampy coast in the Gulf of Mexico, is a handsome tree (50 to 60 feet), with evergreen leaves, and large white fragrant flowers. The bark is used in tanning.

Gore, Mrs Catherine Grace, a clever and prolific English novelist, daughter of Mr Moody, wine-merchant, was born at East Retford, Notinghamshire, in 1799. In 1823 she was married to Captain Charles Arthur Gore, with whom she resided for many years on the Continent, supporting her family by her literary labours. These were varied and voluminous to an extraordinary degree, amounting in all to more than seventy works. She died at Lynwood, Hants, January 27, 1861. Her first published work was Theresa Marchmont (1823). Some of her early novels, as the Lettre de Cachet, and the Reign of Terror (1827), were vivid descriptions of the French Revolution; but her greatest successes were her novels of English fashionable life, conspienous among which were Cecil, or the Adventures of a Coccomb (1841), and Ormington (1842), The Ambassador's Wife, The Banker's Wife, &c. She also wrote The Rose Faucier's Manual (1838). Mrs Gore's books are elever. She had seen much of the world both at home and abroad, and was never at a loss for characters or incidents. The chief feature of her novels is the lively caustic pictures of fashionable and high society, but they are wanting in gennine feeling and simplicity.

Gorée, a small island in French Senegal, lying immediately south of Cape Vord, is almost entirely covered by the town of Gorée, an unhealthy place of (1885) 2200 inhabitants. Its commercial importance is rapidly being transferred to the port of Dakar, which lies over against it on the mainland.

Gorey, a numicipal borough and market-town of County Woxford, 59 miles S. of Dublin by rail, and 3 miles inkund from St George's Channel. Pop. (1851) 2973; (1881) 2450.

Görgei, ARTHUR, commander in chief of the Hungarian forces during the revolt of 1849, was born at Toporez, in the county of Zips, 5th February 1818. On the outbreak of the revolt in 1848, Gorgei at once offered his services to the Hungarian independent government, and first distinguished himself by compelling Jellachich's Croatian reserve of 10,000 men to capitulate to him at Ozora, on 7th October. After this exploit he was given a command against Windischgratz on the western from tier. But, driven back by the Austrian general to Ranb by 26th December, and learning that Budapest had fallen and the government had fled to Debice and thaten and the government had held to Denice-zin, Gürgei made a wide defour through the moun-tains to the north of the capital, and joined his troops to the army in the neighbourhood of De-breezin. Of this force Görgei was made com-mander-in-chief in the end of March 1849. Then, advancing westwards to the relief of Komorn, which still held out against the Austrians, he decisively routed the enemy in a succession of hattles between April 2 and April 10. On April 22 he effected the relief of the heleagnered city, and four days later routed the Anstrians so thoroughly at Uj-Szöny that they were compelled to evacuate the country. Meanwhile a new Austrian army was being equipped, and the Russians were invading the country from the north and north east. At this critical period Görgei wasted valuable time in the siege of Ofen (Buda). After offering an obstinate but unavailing resistance to the Austrians in several battles near Komorn, Görgei was again compelled to retreat castwards; but at Waitzen he encountered the Russians. Still retreating, by way of Tokay, he reached in the beginning of August Grosswardein, where he again suffered defeat from Euskavitch, the Euskin and On 14th Austria Paskevitch, the Russian general. On 11th August he was nominated dictator in Kossuth's stead at Arad, and two days later surrendered his army of 24,000 men, the last of the Hungarian forces in the

field, unconditionally, to the Russian commander Rudiger, at Világos, near Arad. Górgei himself was imprisoned for some time at Klagenfurt, in Carinthia, but eventually set at liherty. His countrymen (including Kossuth) accused him of treachery, a charge to which he replied in Mein Leben and Wirken in Ungarn in 1848 and 1840 (Leip. 1852). With Kossuth and the civil government he failed all along to act in cordial sympathy and harmony, and he is also said to have shown personal jealousy of the other Hungarian generals. He returned to Hungary in 1868, and in 1884 was presented with an address by 260 of his old companions in arms.

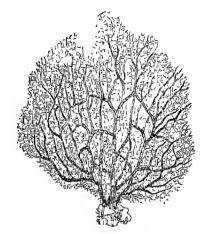
Gorges, Sir Ferdinando's styled 'the father of colonisation in America,' was horn about 1565 at Ashton, in Somersetshire. He founded two Plymouth companies (1606-20 and 1620-35) for acquiring and planting lands in New England, and in 1639 received from the king a charter constituting him proprietor of Maine. He sailed for England in 1643, and died there four years afterwards. His son neglected the province, which finally placed itself under the jurisdiction of Massachusetts, to which colony Sir Ferdinando's grandson sold his rights in 1677 for £1250.

Gorgias, a celebrated threek rhetorician and sophist, of the time of Socrates, was born at Leontini, in Sicily, and came to Athens as ambassador from his native city in 427 B.C. He subsequently settled in Greec, and, becoming famous as a teacher of cloquence, travelled from place to place, acquiring wealth as well as fame. He died at Larissa about 380, more than a hundred years old. He seems to have drawn the extremest consequences of the sophistic negativism; teaching that nothing is, and if it were, it would be unknowedble, and if there were such a thing as knowledge, it would be uncommunicable (see SOPHISTS). Plato's Dialogue Gorgias is written against him. Of a large work by him on Nature nothing remains. Two works attributed to him are extant, the Apology of Palamedes, and the Encomium on Helena, but their genuineness is disputed. The best edition is by Blass (Leip. 1871).

Gorgo, or Gorgon, according to Homer, a frightful female monster inhabiting the infernal regions. Hesiod mentions three Gorgones—Stheno, Earyale, and Medusa, of whom the last named is the chief inheritor of the characteristic attributes of the single Homeric Gorgon. Their habitation was on the brink of the Western Ocean, in the neighbourhood of Night and the Hesperides; but Herodotus and other later writers place it in Libya. They were generally represented as winged virgins with brazen claws and enormous teeth, having on their heads serpents in place of hair, and two serpents round their bodies by way of girdle. According to later legends, Medusa was originally a very beautiful maiden, and the only one of three sisters who was mortal. Having become a mother by Neptune in one of Minerva's temples, that virgin goddess changed her hair into serpents, which gave her so fearful an appearance that whoever looked on her was turned into stone. She was slain by Persens, and her head placed in the shield of Minerva.

Gorgonia, a genus of corals of the Aleyonarian type, in which the colony of polypes forms a branched but flattened growth, supported by an internal axis of horn (cornein) originally derived from the bases of polypes. The genus, which includes over a score of widely distributed species, is nearly allied to the black coral (Plexuara antipathes) of the Red Sea and Indian Ocean, from the black horny axis of which ornancets are often

made; and to the sea-fan (likepidogorgia flabellum), the much branched fan-like skeleton of



Sea-fan.

which is often brought home as a euriosity from the West Indies.

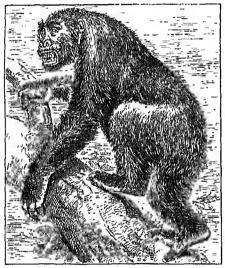
Gorham, (FEORGE CORNELIUS (1787-1857), vicar of Brampford Speke, in North Devon, became famous in connection with the 'Gorham case' in 1848-50. The controversy arose out of the refusal of Dr Henry Phillpotts, Bishop of Exeter, to institute Mr Corham to the vicarage of Brampford Speke, on his presentation thereto by the Lord Chancellor, on the ground that after examination the bishop found him to be of unsound doctrine as to the efficacy of the sacrament of baptism; inasmuel as he held that spiritual regeneration is not given or conferred in that sacrament, and in particular, that infants are not made therein 'memhers of Christ and the children of God,' as the cate-chism and formularies of the church declare them to be. The case was brought before the Arches Court of Canterbury, which decided (1849) that baptismal regeneration is the doctrine of the Church of England, and that the appeal must be dismissed with costs. From this decision Gorham appealed to the judicial committee of Privy-council. court found that differences of opinion on various points left open were always thought consistent with subscription to the articles, and that opinions in no important particular to be distinguished from Gorham's had been maintained without censure by many eminent prelates and divines: the court therefore decided that the judgment of the Arches Court should be reversed, and Gorham was, after some further litigation, instituted to Brampford Speke. During the two years that the suit was pending the theological question was discussed with all decrees of a hilling and accinence. with all degrees of ability and acrimony in sermons and pamphlets.

Gorilla (Troglodytes Gorilla), a great African ape, generally referred by naturalists to the same genus with the chimpanzee, although Professor Isidore Geoffroy St-Hilaire has attempted to establish for it a separate genus. It has received the name by which it is now known in consequence of its being supposed to be the same animal which is mentioned in the Periplus of Hanno the Carthaginian navigator, who visited the tropical parts of the west coast of Africa about the year 350 B.C., although it is by no means certain that the gorilla of Hanno is not the chimpanzee, or perhaps a species of baboon. Vague accounts of apes of great size, of which very wonderful stories were told,

228

wore from time to time brought from Western Africa; but it was not till 1847 that the gorilla became really known to naturalists, when a skull was sent to Professor Wyman of Boston by Dr Wilson, an American missionary on the Gaboon River. Since that time not only have skeletons and skins been obtained in sufficient number for scientific examination, but information has also been procured concerning the habits of the animal in his native haunts. The accounts of the ganilla given in Du Chaillu's Explorations and Advantures in Equatorial Africa (Lond. 1861) soon came to be regarded by the highest scientific authorities, and particularly by Owen, as in the main trustworthy, notwithstanding all the doubt that was cast over that traveller's narrative of his adventures; and they are in accordance with all that has been learnt from other sources, and with the inferences to be deduced from the dentition and esteology of the

The gorilla differs from the chimpanzee in its greater size; the height of an adult male in an erect posture being commonly about 5 feet 6 inches or 5 feet 8 inches, although there is reason to think that it sometimes exceeds 6 feet. The general aspect of the creature may be gathered from the accompanying figure. The skin is very black;



Gorilla (Troglodytes Gorilla).

the hairy covering of the back is thicker than on the belly; its colour varies in individuals and on different parts of the body from roddish-brown to black.

The skeleton is very powerful and massive, and differs from the human skeloton in the following (among other) points. The skull is extremely prognathous, the supra-orbital ridges are enormously developed; there is a great crest between the frontals and parietal bunes which joins the occiput crest. The canine teeth are very large, particularly in the male. The cervical vertebrus have very long spinous processes. The ribs increase progressively in their span, the chest cavity being thus more or less conical in form. The arm bones are much longer than in man, while the leg bones are shorter.

The muscular anatomy shows also certain marked differences from man, as does also the brain. The gorilla cannot be regarded as nearer to man than the chimpanzee and orang. There are a number of varieties of the gorilla, but apparently only one

species, which is confined to the forests of West Africa between 2° N. and 5° S. lat., and 6° and 16° E. long. It is principally a vegetable feeder, though like most

though like most apes it also preys upon small mammals, birds, and their eggs.

The gorilla wanders about in families, consisting of one male and their yaung; most of the time is spent upon the ground, though the animal is a skilful climber, it is not so ferocious a creature



Hand (a) and foot (b) of Gorilla,

as has been supposed, and when molested generally avoids an encounter; but if driven into a corner it will defend itself, and its enomons strength renders it a dangerous enemy. On such occasions it will advance to the attack, beating its breast with its lists and giving forth a furious roar. The gorilla has not been hitherto tuned, and, in an adult state at least, seems very incapable of it. In 1876 a live gorilla was brought to Berlin, the first anthentic instance of the introduction of the animal into Europe; and in 1887 a young gorilla was exhibited at the Zoological Gardons in the Regent's Park. The name given to this animal in its native country is N'gina, or Ingena. On the Loango coast it is called N'punga. For the skeleton, see Anthropold Apes, and the books there eited.

Gorkum (Dutch Gorinchem), a fortified town of South Holland, on the Merwede, 22 miles ESE, of Rotterdam, possesses an arsenal. Pop. (1888) 11,519.

Görlitz, a town of Prussian Silesia, is situated on a declivity on the left bank of the Neisse, 49 miles W. of Liegnitz. One of its old mural towers, the Kaisertrutz, is now the guard-heuse and armoury. Among the beautiful Gothie churches the most interesting is that of St Peter and St Paul, built 1423-97, with five naves. Outside the town is the Krenzkapelle, an imitation of the Holy Sepulehre at Jernsalem, built 1481-89. A railway viadnet, upwards of 2720 feet in length and 118 feet high, here crosses the valley of the Neisse. Görlitz has manufactures of cloth, which is its staple, cottan, linen, and fietile wares, with ironfoundries and machine-shops. Here Jacob Bochme spent most of his life and died. Pop. (1843) 15,200; (1885) 55,470, mostly Protestants. Görlitz was taken and held alternately by the Swedes and the Imperialists during the Thirty Years' War.

Görres, Jakob Joseph von, a distinguished German author, was born at Coblenz, 25th January 1776. In common with most of the ardent youth of the time, Görres throw himself eagerly into the movement of the French Revolution; and a journal established by him, Das Rothe Blatt, advanced the most extreme opinions of the time. In 1799 he wont to Paris as the chief of a deputation to negotiate the annexation of the Rhine-land to the French Republic, but in Paris became convinced of Napoleon's despetism. On his roturn to Germany he settled down as a lecturer on physics in his native town, and devoted himself exclusively to literature for several years. In 1807 he published the first part of his well-known collection of German Volksbücher; and in 1810 his work on Asiatic mythology. From these studios, however, he was aroused to the hope of liberation

from French tyranny by the reverses of the French arms in the Russian expedition. Appealing to the national sentiment of his countrymen in the Rheinischer Merkur, he became, in truth, the literary centre of the national movement. After the re-establishment of German independence Görres denonneed the encroachments of domestic absolutism with the same energy, until, having drawn upon himself the displeasure of the Prussian government, he was obliged to flee to France, and afterwards to Switzerland. In 1827 he accepted the professorship of the History of Literature in the university just founded at Munich by the liberal King Louis of Bavaria. His later years were devoted to literature, and to the controversies as to mixed marriages and Hermesianism (see Hermes). He was the founder of the Catholic journal, Die Historisch-Politischen Blätter. His ellie work was his Christliche Mystik (1842; new ed. 1879). He died 29th January 1848. An edition of his works (9 vols.) appeared hetween 1854 and 1874. See the Life by Sepp (1876).

Gortschakoff, Prince Alexander Michael Alexander Michael, a distinguished officer. He was educated at the celebrated Lyceum of Transkoe-Selo, and acquired experience in diplomacy under Nesselrode. Ambassador at Vienna (1854-56), he displayed great judgment and ability during the Crimean war, and it was chiefly through his influence that Russia agreed to the treaty of Paris. After this event Prince Gortschakoff succeeded Nesselrode as minister of foreign affairs. When France became hostile to Austria on the Italian question, he cultivated the friendship of the former. Desirous of restoring the prestige of Russia in European affairs, he addressed a circular dispatch to the Powers in 1860 in favour of the principle of nationalities in the Two Sicilies. He also favoured the French expedicion of 1861 to Syria on behalf of the oppressed Christians, but he declined to associate himself with France and Great Britain in their unfriendly attitude towards the United States after the outbreak of the eivil war. Touching the Polish insurrection of 1863, he repudiated foreign dictation, and asserted the right of Russia to settle her internal affairs in accordance with her own interests and the integrity of the empire. By this step he acquired great popularity at home and respect abroad, and he was appointed chancellor of the empire in July 1863. From this time until the ascendancy of Bismarck he was the most powerful minister in Europe.

He remained neutral during the struggle between Prussia and Austria; and, owing to a definite understanding between the Russian and Prussian chancellors, the neutrality of Austria was secured in the great Franco-Prussian war of 1870. Gortschakoff further availed himself of this war to counteract the injury done to Russian influence by the treaty of Paris. At the London Conference in January 1871 he procured the revision of the treaty, and the formation of another putting an end to the neutralisation of the Black Sea. For this service the emperor conferred upon him the dignity of Screne Highness. In 1873–74 he manifested a desire to preserve friendly relations with England in regard to central Asia, but this was scarcely consistent with his aggressive policy. In the Servian war of 1878 Gortschakoff took up an indecisive attitude; and after the conclusion of the Turko-Russian war, the repudiation of the treaty of San Stefano, and the signing of the treaty of Berlin his influence began to wane. At the Berlin Congress Bismarck and Beaconsfield had paid more attention to Schouvaloff than to the eliancellor. Gortschakoff altogether eeased to be

the first factor in Enropean politics before Alexander II. was assassinated, and long before he was superseded by M. de Giers as minister for foreign affairs in March 1882. Gortschakoff's sphere of action was Enropean, not local; he ignored too much Russian developments and Russian aspirations, took no active interest in the serious financial and industrial problems affecting his country, or in the growth of Nihilism, and he even failed to bear his part in the abolition of scifdom. After his retirement he left Russia for Baden-Baden, where he died on 1st March 1883. Gortschakoff was a man of considerable culture and a friend of the liberal arts. His diplomatic circulars were remarkable for their excellent diction, their wit, and their resistless logic. The name is also Englished by Gortchakoff and Gorchakov. See Klaczko's Two Chancellors (Eng. trans. 1876).

Gortschakoff, Prince Michael, cousin of the above, was born in 1795, and served against the French in 1812-14 and against the Triks in 1828-29. In the war of the Polish revolution of 1831 he greatly distinguished himself, and was made general of artillery. He was appointed military governor of Warsaw in 1846, and took part in the invasion of Hungary in 1849. On the outbreak of the Crimean war he twice commanded the Russian army despatched to the Danubian Principalities, on the second occasion leading the retreating Russian forces into Bessarabia after the raising of the siege of Silistria. In 1855 he was appointed commander-in-chief in the Crimea and southern Russia. He was defeated on the Tchernaya, but recovered his laurels by his gallant defence of Sebastopol, and by his skilful retreat to the North Fort after the blowing up of the fortress. Alexander II. appointed him governor of Poland in 1856, and he was engaged in carrying out the conciliatory policy of the exar when his death occurred on May 30, 1861.

Gory Dew, a dark-red slimy film sometimes seen on damp walls and in sludy places. Its appearance on the whitewashed walls of damp cellars, &c. is apt to occasion alarm from its resemblance to blood. It is one of the lowest forms of vegetable life, an alga of the group Palmellacea, and allied to the plant to which the phenomenon of Red Snow (q.v.) is due. Its botanical name is Porphyridium cruentum (Palmella cruenta). See Palmellaleea, and Alga.

Görz, capital of the Austrian crown-land of Görz-Gradisea, in the Küstenland, is charmingly situated in a fruitful plain, near the Isonzo, 35 miles NNW. of Trieste by rail. Shut in by mountains on all sides except the south, it enjoys an almost Italian climate, and has of late years acquired some fame as a health-resort. Among its principal buildings are the old castle of the former Counts of Görz and the former Jesuit college, both now used as barracks; the cathedral, with a beautiful sacristy; and the prince-bishop's and several other palaces. The surrounding plain is covered with vineyards, and industries are the cultivation and export of fruit and wine, whilst Görz's specialty has long been the printing of Hebrew books for the East. There are dyeworks, and important manufactures of flour, sugar, cotton, silks, rosoglio, paper, leather, soap, and matches. In a Franciscan cloister close by are the graves of Charles X. of France (q.v.), the Due d'Angoulème and his wife, and the Comte de Chambord. Pop. (1869) 16,659; (1880) 20,920. See Schatzmayer, Der Kurort Görz (1886).—The Austrian-Illyrian Küstenland ('Coastland') includes the principality of Görz-Gradisca, the margraviate of Istria, with the Quarnero Islands, and Trieste and its territory. Its boundaries are the Adriatic on the south, and

on the remaining sides Venice, Carinthia, Carniola, and Croatia. Area, 3075 sq. m.; pop. (1880) 647,943.

Goschen, George Joachim, English statesman, son of a London merchant of German extraction, was born in London, August 10, 1831. In 1863 he drew attention to himself by publishing The Theory of Forcipe Exchanges (13th ed. 1888), and in the same year entered parliament as a Liberal for the City of London. When Lord Russell, after Palmerston's death, reorganised the Liberal ministry, he appointed Goschen Vicepresident of the Board of Trade, November 1865. In the following January the latter entered the cabinet in consequence of his appointment as chancellor of the Duchy of Lancaster. When Gladstone became prime-minister in 1868, Goschen took office as President of the Poor-law Board, but three years later became the head of the Admiralty, which post he retained until the fall of the Gladstone ministry in 1874. Goschen's next public work was the regulation, in conjunction with Joubert, of the Egyptian finances (1876). Then in 1878 he represented Great Britain at the international monetary conference held at Paris, and two years afterwards, as ambassador extraordinary to the Porte, was mainly instrumental in inducing Turkey to fulfil towards Greece, though imperfectly, the obligations entered into by her at the treaty of Berlin. Gladstone had in Goschen a firm and decided opponent of his Irish Home-rule policy from the time he first announced it. In 1887, when Lord Salisbury assumed power, Goschen took his seat as a Liberal Unionist and accepted the chancellorship of the Exchequer. A statoment of his arguments against the extension of state interference will be found in his published pamphlet, Laissez-frive and Government Interference (1883). In 1888 Goschen snecessfully carried out a conversion of part of the National Debt (q.v.).

Goshawk (lit., 'goose-hawk') (Astur), a genus in the family Falconide, nearly related to the sparrow-hawks (Accipiter), and like the latter distinguished from the falcons proper by not having a toothed or notched bill. The British species (A. palumburius) is now only a visitor, and a rare one. It is common in the forests of north-



Goshawk (Astur palumbarius).

ern and central Europe, ranges as east as Japan. and as far south as Morocco and Egypt. It is a rapacions bird, following small mammals and game-birds and rapidly altered 65.7 swift, persistent, The prevalent colour of the plumage is ashybrown; the size of the females, which are dearc deeidedly larger, is about two feet. The nest is large, built of sticks,

and placed in a tree. The eggs (four) are bluishgray in colour, and laid in April or May. The goshawk used to breed in Britain, and though termed 'ignoble' was employed in Falcoury (q.v.) for hunting ground-game, on which it naturally urovs.

The goshawk of the northern United States (A. atricopillus) is larger and handsomer, but otherwise very like the Emopean species. Andinbon describes its meteor-like flight, the power of steering afforded by the long tail, its vigilant industrions rapacity, and the characteristic erectness of its attitude when perched or engaged with its prey. A stray specimen, said to have been shot in Perthshire, is preserved in the Edinburgh Misseum. The Anstralian Goshawk (A. novæ hollandiæ), sometimes called a white eagle, is remarkable in being 'apparently a permanent albino.'

Goshen, that part of ancient Egypt which Pharaoh presented to the kindled of Joseph when they came to sojourn in that country, appears to have lain between the eastern delta of the Nile and the Isthmus of Snez, as far south as the modern Ismailia. The district is generally supposed to have lain round about the Egyptian Kesem (Goshen is Gesem in the Septnagint), a name preserved in the classical Phaeusa (Pa-Kesem), now Pakoos, about 45 miles S. of Damietta. But in 1885-87 M. Naville tried to prove that Goshen is represented by Saft-el-Henna, 6 miles E. of Zagazig, in the Wady Tumilat. See the Fourth Memoir of the Egypt Exploration Fund (1888).—The Land of Goshen was the name given to a part of the Barolong country in Bechnanaland, Sonth Africa, which became in 1884 the seat of a mushroom Boer republic, founded by the maranders who had supported Moshetto, the rival of Montsioa in his contest for the headship of the Barolongs. It was, along with the rest of Bechnanaland, declared to be under British protection in September 1885.

Goslar, an ancient town of Hanover, situated on the north slope of the Harz Mountains, 27 miles SE, of Hildesheim. At one time a free imperial city, and the residence of the emperors, it has several noteworthy old buildings, as the tower called the 'Zwinger,' with walls 23 feet thick; the Late Romanesque clurch Neuwerk, of the 12th century, and the Frankenberger clurch (1108, restored 1880), both with ancient frescoes; the emperor's house, built in 1050 by Henry HI., the dwelling-honse of the emperors till the middle of the 13th century, the meeting-place of more than a score of imperial diets, restored in 1867-80, and adorned with frescoes by Wislicems; the town-house, built in 1136-84; and the Kaiserworth, an old building containing statues of eight emperors. To the south of the town is the Rammelsberg, a mountain formerly very rich in silver, gold, copper, lead, sulphur, and green vibriol (sulphate of iron). The mines have been worked since 968, and are still in operation. Go-lar was founded by Henry J. in 920. About 1350 it joined the Hanseatic League. Its ancient prosperity began to depart from it in the middle of the 16th century; and it suffered severely from the Swedes in the Thirty Years' War. In 1802 it ceased to be a free imperial town and fell to Prussia, to whom it again returned in 1866, after having in the meantime belonged to Westphalia (from 1807) and Hanover (from 1816). Here were born the Emperor Henry IV. and Maurice of Saxony. Pop. (1875) 9838; (1885) 11,690. See works by Mitholi (1874) and Wolfstieg (1885).

Gospellers, a word used with three different designations. (1) A term applied by the Roman Catholies to those Reformers who taught the people the words of Scripture in their own vulgar tongue, as Wyelif and his followers.—(2) A class of Antinomians, about the period of the Reformation, who drew 'strango inferences' from the doctrine

GOSPELS 309

of predestination. -(3) The priest who reads the Gospel in the communion service of the Church of England, standing on the north side of the altar.

Gospels. The word eutrgetion, which in classical Greek originally meant 'the reward for good news' (Odyssey, xiv. 152; comp. 2 Sam. iv. 10, LXX.), but afterwards simply 'good news' (Plutarch, Lucian, Appian), has from Anglo-Saxon times been rendered by the word Gospet (Godspell—i.e. story of God [Christ]). In the New Testament it is always used in the singular, and means 'the good news of the kingdom' as proclaimed by Christ and his apostles. Perhaps, however, in Mark i. I there is some trace of the technical sense, as denoting a written narrative of the life and utterances of ing a written narrative of the life and interances of Jesus, which it had fully acquired by the end of the 2d century (Justin Martyr, Apol. I. 66: 'the memoirs of the apostles... which are called gospels'). The gradual rise of the historical portion of the New Testament (helonging for the most part to a later period than the Epistles, which are the earliest extant documents of Christianity) has already been briefly traced in the article BIBLE (Vol. II. p. 124), where also the fact of the fixation of the four-fold gasted cure helps the gloss of the of the four-fold gaspel canon before the close of the of the four-told gasper entan heater the close of the 2d century has been stated; see also separate articles on MATTHEW, MARK, LUKE, and JOHN. Here it is enough to say that, since the canon was ecclesiastically settled, it has been the unvarying belief of the church in all its branches that these four gospels are to be received as clothed with apostolic anthority—Matthew and John as written by apostles, Mark and Luke as written by companions of apostles.

Of the forr, that of John is distinguished by peculiarities which give it a unique place among the New Testament writings, and will most conveniently be treated in the separate article. The first three, on the other hand, have very much in common; in fact, they present such a similarity in matter and form that they readily admit of heing brought under one and the same 'com-bined view' or 'synopsis,' from which circum-stance they have since the time of Griesbach (who coincid the phrase) been commonly designated the 'synoptical' gospels (see the *Harmonics*, such as Tischendorf's *Synopsis Evangelica*). The resemblance is both in substance and in language. (1) They give the same general ontline of the life of Jesus, and to a large extent select the same incidents for detailed treatment. Thus, they relate, on the whole, the same miracles, and preserve the same discourses. They are silent also on the same points; two, for example, give the woe pronounced upon Chorazin and Bethsaida, but no one of the three has anything precise to say about the occasion that called it forth. Various attempts have been made to represent in tabular and graphic form the amount of material coincidence between the synoptics; but it is probably impossible to do so with absolute exactness. The following estimate, however, the result of a recent somewhat careful examination, may be taken as approximately representing the facts. Of a total of 1071 verses, Matthew has 387 in common with Mark and Luke, 130 in common with Mark 184 in common with Luke, 130 in common with Mark 184 in common with Luke, 184 in common with Luke, 184 in common with Luke, and 370 peculiar to himself. Of Mark's 662 verses, 406 are common to all three synoptists, 145 common to Mark and Matthew, 60 common to Mark and Luke, and 51 (on a liberal estimate) peculiar to himself. Luke out of 1151 verses shares 390 with Matthew and Mark, 176 with Matthew, 41 with Mark, and has 544 peculiar to himself. (2) They often agree in a remarkable manner in the order in which they give the events they relate, even where the events themselves are only loosely connected; thus, in Matt. ix., Mark ii., and Luke v., the miraculous healing of the paralytic, Matthew's

call and feast, the discourse on fasting, follow one another; in two go-pels the last-mentioned discourse is immediately followed by the incident in the cornfield, which again, in all three, is followed by the healing of the withered hand. In Matthew and Mark the death of the Baptist is introduced at the same point and in the same way, but out of its eluonological order. For full discussion of these and other instances reference must be used to the total leads (2) In proper ence must be made to the text-books. (3) In many instances they use identical language. This cirinstances they use identical language. cumstance would be striking enough even if it were observable only in cases where discourses are reported, when it is remembered that these discomses were almost certainly spoken in Aramaic; but its significance is vastly increased when it Mark, vi. 41, 42; Luke, ix. 16, 17; Matt. xvii. 5; Mark, ix. 7; Luke, ix. 35; Matt. ix. 1–8; Mark, ii. 1–12; Luke, v. 17–20—where observe the parenthelic and the control of the control o thesis common to all three, 'then saith he to the sick of the pulsy'), when it is shown in the use of rare words or expressions, or when all coincide in quoting the Old Testament in a way that differs lath from the Hebrew and the Septuagint text.

It is only in modern times that such phenomena as these in the synoptic gospels have attracted serious attention or received critical study. Doubtless they had been often noticed before, but the fact of so large a degree of coincidence was not felt to be at all surprising. All three gospels were held to be first-band narratives, and primarily all by the same author, the inspiring spirit of God. The resemblance, therefore, was only what might have been expected. Were further explanation have been expected. Were further explanation pressed for, it was enough to suggest that Mark had copied from Matthew, and Luke had access to both, and this assumed dependence of the later on the earlier evaugelist was not felt to affect in any way their importance as really independent, because immediately inspired. More embarrassing were their apparent divergences and even seeming contradictions in narrating what purported to be the same events (e.g. the resurrection and the post-resurrection appearances of Jesus), and their discrepancies of language in relating what seemed to be the same discourses. The reconciliation of these discrepancies and divergences (which were held to be apparent only) was the object of numer-ous compilers of 'Gospel Harmonies.'

The so-called 'synoptical problem' took shape in Germany towards the close of the 18th century. The disenssion began in a refutation by Koppe (Muraus non Epitomator Matthwi, 1782) of the thaditionally received view, first started by Augustine, that Mark in writing his gospel had merely followed Matthew and abridged him. Important contributions towards the advancement of the question were made in succeeding decades by such men as Lessing, Eichhorn, Griesbach, Schleier-macher, Gieseler, De Wette, Lachmann, Banr, Ewald, Bleek, Ritschl, and others too numerons to mention. In the course of the investigation three broad lines of explanation were attempted. (1) The 'Benutzungs hypothese,' or borrowing hypothesis, sought to explain the facts by supposing that the second evangelist in order of time (whoever he was) borrowed from the first, and that the third borrowed from either or both of his predecessors. Of this theory numerous forms are logically and mathematically conceivable, and almost all of these have in the course of a century's discussion found able advocates. Perhaps the most popular form has been the 'combination' theory—that Mark is a combination of Matthew and Luke. (2) The 'Ur-evangelinms-hypothese' songht to establish the existence of a primitive written gospel, no longer extant, to which, however, all the evangelists had

GOSPELS

access, and of which they each made independent use. (3) The 'tradition-hypothesis' was that each evangelist drew his matter independently of the others from an oral apostolic tradition which had

become stereotyped.

The result of the discussion has been to make it plain that no one of these theories is by itself sufficient to cover all the facts of the case. The borrowing hypothesis may account for the coincidences, but it leaves the discrepancies unexplained and inexplicable. The same remark applies to the and mexphesion. The same tentar applies to the assumption of a primitive gospel or gospels; it has been found necessary by its advocates to assume a multiplicity of lost documents in a manner that raises difficulties, historical and other, quite as great as those which it seeks to remove. The oral tradition theory, again, might serve to account for the discrepancies, but when it is sought to explain the immense amount of coincidence by means of it. the improbability of a stereotype tradition of such mass, confining itself so closely to the same incidents, told in so nearly the same order and in lan-guage so little varying, is seen to be very great. But, on the other hand, it is now more or less generally admitted that all three theories contained important elements of truth. (1) in connection with the oral tradition hypothesis it seems tolerably clear that for at least a generation after the death of Christ no important attempt was made to comor curst no important attempt was made to commit to writing any record, however brief, of the leading facts of his life or the main elements of his preaching. This was no doubt partly due to the widespread belief that his second coming and the end of the world were close at band. The epistles were, as has already been said, the earliest literary productions of Christianity, and these were all called forth by occasions much more definite than any that had as yet presented themselves for than any that had as yet presented themselves for writing memoirs of Christ. But the life and words of Christ were the continual subject of the preachof Christ were the continual subject of the preaching and catechising of the apostles and their converts, a subject they naturally expounded in connection with the Old Testament scriptures. These he had perfectly and completely fulfilled, and Christ was therefore songht in the Old Testament prophecies in a way that made the early Christians feel little need of a written gospel. That this traditional preaching and catechising That this traditional preaching and catchising would tend to become stereotyped within each apostolic circle is manifest; but that it was also capable of taking different forms in different circles is shown (to take obvious examples) by the want of correspondence between the narratives of the nativity and of the respectively. (2) As regards a primitive gospel (or Ur-evangelium, as Eichhorn first called it expectively. first called it), specialists are becoming more and more at one in recognising two relatively primitive documents embedded wholly or in part in the existaccording to Mark, or an earlier draft thereof; (b) in a so-called 'logia' document, composed mainly of sayings and discourses of the Lord—a document which was largely drawn upon by the authors of the first and third gospels for much of what they have in comparable the scale of the contract of the first and third gospels for much of what they have in common with each other apart from Mark. The reasons for abandoning the ancient view of Mark's dependence on Matthew, and for now regarding his as the earliest of our existing gospels, depend largely on considerations as to his language, style, and general point of view which cannot be even indicated here, nor does space allow mention to be made of the various minute distinguish between an original Mark (Ur-Marens) and the present form of the second gospel. The designation of the 'logia' document is taken from a much discussed fragment of a very early author,

Papias, preserved by Enselius, to the effect that 'Matthew composed ta logia [the oracles, or the discourses of our Lord] in the Hebrew [i.e. Jewish-Aranaic] dialoct, and each one interpreted them as he could.' Schleiermacher was the first to point ont the importance of this passage in its possible bearings on criticism. (3) The borrowing hypo-thesis, in the sense that the authors of the first and third gospels knew and very freely used the earlier work of Mark, is by no means a violent one, and seems in many cases to afford the true explanation

of the facts.

The drift of current opinion among specialists may perhaps be stated somewhat as follows: When after the lapse of a generation or so it began to be seen that probably the end of all things was not yet quite at hand, and that in all likelihood the church had still before her a prolonged period of work in the present world, it was felt to be a litting thing that the most important utterances of the Lord, which the apostles had been in the of the Lord, which the apostles had been in the habit of quoting as supremely authoritative for all Christians, should be preserved from the risk of perversion, interpolation, or oblivion. Thus came to be written down, by some apostolic man—very likely by the apostle Matthew himself, a practised scribe—a collection of discourses, paralles, predictions, and aphorisms, not improbably in somewhat loose connection, yet at the same time not without some incidental notice of the eirenmstances which occasioned a given utterance, or same notes of the dialogue which led up to the weighty aphorism. This collection was (as has weighty uphorism. This collection was (as has been seen) written in Aramaic. About the same time, Mark, the 'interpreter' of Peter, as ancient tradition ealls him, was arranging in Greek his fragmentary recollections or memoirs of what he had heard Peter tell of the incidents of the period of his own personal converse with Jesus. These he would not scruple to supplement with matter drawn from other sources, so long as he knew it to be trustworthy. Both the above documents ohtained wide currency, the former was translated into Greek more or less inadequately, the two were seen to be mutually complementary, and it was inevitable that an attempt should be made to combine them. This was successfully done by the author of the first gospel, a writer in Greek, who had in view in the first instance Jewish Christians, and sought to bring into all possible clearness the organic development of Christianity out of the Old Testament dispensation of symbol, prophecy, and promise. After the destruction of Jerusalem, when Romo had become one of the most important centres of Christianity, there was edited in that city the present form of the second gospel, specially adapted for the apprehension and acceptance of Centile Christians. At a somewhat later date, and possibly in Romo also, was compiled the third gospel in dependence chiefly on the 'logia' document and on Mark, but not without some knowledge of the list gospel, and with in-portant additions from oral or written sources which cannot now be traced, but which probably

represented a Judean tradition.

Thus it appears that each of the three theories onumerated above has something real to contribute by way of explanation of the origin of the synoptic gospels. Primitive documents are embedded in them; they contain an element of ancient oral tradition; and they are not independent one of another. But no one of them is a primary doen-ment in the sense of baving been written in its present form from direct personal knowledge; and it is obvious that each succeeding evangelist, in availing himself of the lahours of his predecessor, did so with a feeling of perfect freedom, not claiming for himself, nor according to his fellow, nor

expecting for either from the church any title to anthority as infallible.

HARMONIES OF THE GOSPELS.—Compilations of this nature, designed to facilitate comparison and mutual illustration of the different narratives, and to bring out illustration of the different narratives, and to bring out their essential agreement and consistoney in seeming divergence, began to be made at an early date. The earliest known is the *Diatessaron* of Tatian (q.v.). Jerome also makes allusion to the work of a certain Theophilus, Bishop of Antioch, toward the close of the 2d century, who had left a monument of his ingenuity by the their transfer and left the things and left the state of the close of the contract of the cont by fitting together into one whole the things said by the four evangelists.' Eusebins tells us that in the middle of the 3d century a certain Ammonius of Alexandria also constructed a diatessaron, taking Matthew as his basis, and placing side by side with him the parallel passages in the other three gospels. This work suggested to Eusebius himself the plan of his own Sections and Canons. In this each gospel is divided separately into Canons. In this each gospet is divided separately mose sections which are numbered contamonsly, and, further, there is a table of ten canons each containing a list of passages. The first canon, in four columns, exhibits all the passages which are common to the four gospets; the second, third, and fourth, in three columns, show the the passages which are common to the four gospels; the second, third, and fourth, in three columns, show the passages which are found in any three; the fifth, sixth, seventh, eighth, and minth, those which are common to any two; and the tenth, in four separate lists, the passages peculiar to a single evengelist. This work of Eusebius, which was afterwards adapted to the Vulgate by Jereme, centinued to be used as a key to the eencordance of the gospels, down to the 16th century. Of post-Refermation harmonics, the carliest is the Harmonia Evangelica of Osiander (1537), whose doctrine of inspiration led him to believe that each evangelest must have written in strict obremological order, and that therefore, written in strict ohronological order, and that therefore, whorever there is the slightest divergence as to time, place, or circumstance between any two evangelists in any given narrative, it is necessary to assume the events thus differently related to have been distinct. On these thus differently related to have been distinct. On these principles ho is compelled to make cut that Peter denied list Lord nine times. Calvin's Harmonia ex tribus Erangelistis Composita (1553) represents a much more moderate view. The number of works bearing the title of Harmonies or Synopses that have appeared during the last three centuries is very great. The best and most popular of them—such as those of Clericus (1700), Mackinght (1756), Griesbach (1776), Rebinsen (1845) Wisseler (1843), Anger (1852), Stroud (1853)—are enumerated by Tischenderf in his own Synopsis Evanyetica, the latest and most convenient of them all (5th ed. 1884).

(5th ed. 1884).

LITERATURE.—For the older literature on the synoptic gespols, reference must be made to the handbooks of Biblical Introduction and Church History, and to the more recent commentaries. Among these last that of Alford in his Greek Testament (7th ed. 1874—77) retains an honourable place. See also the Speaker's Commentary. Of translations from the German, the commentaries of Meyer and Lange claim special mention; of the former, which is the less homiletical and more scientific of the two, the latest (7th) German edition is by B. Weiss (1883–85). Köll's Commentary on Matthew appeared in 1877, and that on Mark and Luke in 1879. In the new 1883-80). Kol's Commentary on Matthew appeared in 1877, and that on Mark and Luke in 1879. In the new Hand-Commentar zum Neuen Testament the synoptics are ably treated by H. J. Holtzmann (1889). Ewald's Die drei ersten Evangelien übersetzt u. erklärt (1871) is still of value. See too Reuss, Histoire Evangelique (1876); and compare the bibliographies under BIBLE and JESUS. For the presented of control to the control of the second street of the sec

For the apocryphal Gospels, see APOCRYPHA.

On the synoptical problem the fullest and latest stateon the synoptical problem the fullest and latest statements are to be found in Holtzmann, Einleitung in das Neue Testament (2d ed. 1886), and B. Weiss, Einl. in d. Neue Test. (2d ed. 1889). The latter has been translated into English, A Manual of Introduction to the New Testament (1887). Both these writers recognise a 'logia' doenment, and the priority of Mark to both the first and the third canonical gospel. Weiss, however, thinks that the latest decreases a transfer on the state of the state thinks that the logia document contained a very considerable number of incidents also, and that Mark had access to it. able number of incidents also, and that Merk has necess to it. The fullest discussions by English schelars are those of Dr E. A. Abbott in the art. 'Gespels' in vol. x. of Ency. Brit. (1880), and by Professor Salmon, Historical Introduction to the Books of the New Testament (4th ed. 1889). Dr Abbott seeks to disentangle the original 'triple' tradition borne witness to by the three

syuoptics; he finds that Mark is of earlier date than Matthew, and contains the calliest Greek tradition, itself a translation of the very early Aramaic tradition. Dr Salmon argues for a form of the Ur-evangelium hypothesis; bathon argues for a form of the Orevangement hypomens; be thinks the theory of a common Greek original is required by the verbal coincidences, and by the common eitations of the Old Testament. Mark's gospel represents the original source most fully, but was probably latest in publication, and certainly not copied either by Matthew or by Luke. Dr Westcott in his Introduction to the Study of the Gorpels (1851; 7th ed. 1888), which unfortunately has not been brought down to date, argues for the oral hypothesis. This theory is also that of Alford. Of the borrowing bypothesis the latest and Alford. Of the borrowing hypothesis the latest and ablost exponent is Dr Pfleiderer, who in his Urchristenthum (1887) shows the priority of Mark, but thinks that Matthew depended bliefly on Luke. For detailed study of the relations of the synopties, Rushbrooke's Symoptics (1880), which gives all the textual facts with graphic completeness, may be characterised as indispensable. Compare also Rushbrooke and Abbett's little manual entitled Common Tradition of the Symoptical Gospels in the Text of the Revised Version (1884).

Gosport ('God's port'), a market town and seaport of England, in the county of Hants, stands on the western shore of Portsmonth harbour, and directly opposite Portsmanth, with which it is connected by a floating bridge. Here are an extensive iron-foundry for the manufacture of anchors and chain-cables, naval powder-magazines, several barracks, the Royal Clarence victualling yard, which contains which contains a brewery, a biscuit-baking establishment worked entirely by steam, and mimerous storehouses, and Haslar Hospital (q.v.). Tho town has also some sail-making and yacht-building, and considerable coasting trade. Pop. (1851) 7414; (1881) 12,343.

Gossamer, a light filamentous substance which often fills the atmosphere to a remarkable degree during fine weather in the latter part of autumn, or is spread over the whole face of the ground, stretching from leaf to leaf, and from plant to plant, loaded with entangled dew-drops, which glisten and sparkle in the sunshine. Various glisten and sparkle in the sunshine. opinions were formerly entertained concerning the opinions were formerly entertained concerning the nature and origin of gossamer, but it is now sufficiently ascertained to be produced by small spiders, not, however, by any single species, but by several, not improbably many, species; whilst it is also said to be produced by young and not by mature spiders, a circumstance which, if placed beyond doubt, would help to account for its appearance at a particular season of the year. The production of gossamer by spiders was first demonstrated by the observations of Dr Hulse and Dr Lister in the 17th century: but these observations did not for 17th century; but these observations did not for a long time meet with due regard and credit, particularly amongst the naturalists of continental Europe. It is not yet well known if the gossamer spread over the surface of the earth is produced by the same species of spider which produces that seen floating in the air, or falling as if from the clouds. Why gossamer threads or webs are produced by the spiders at all is also a question not very easily answered. That they are meant merely for entangling insect prey does not seem probablo; the extreme eagerness which some of the small spiders known to produce them show for water to drink has led to the supposition that the dewdrops which collect on them may be one of the objects of the formation of those on the surface of the ground, whilst it has been also supposed that they may afford a more rapid and convenient mede of transit from place to place than the employment of the legs of the animal. As to the gossamers in the air, conjecture is still more at a loss. They are certainly not accidentally wafted up from the ground, as might be supposed; the spiders which produce them are wafted up along with them; but

whether for the mere enjoyment of an aërial ex-cursion, or in order to shift from place to place, is not clear, although the latter supposition is, on the whole, the most probable. The threads of the whole, the most probable. The threads of gossamer are so delicate that a single one eannot be seen unless the snn shines on it; but, being driven about by the wind, they often become beaten together into thicker threads and flakes. They are often to be felt on the face when they are searcely visible. The spiders which produce these threads shoot them out from their spinnerets, a viseid fluid being ejected with great force, which such threads are produced at once in a radiating form, and these, being caught by the ascending current of heated air, are borne upwards, the spider along with them. It has been said that the spider has even some power of guiding in the air the web by which it is wafted up (see SPIDER). The web by which it is water hip (see SPIDER). The etymology has been much disputed. According to Skeat, gossamer, the Middle English gossomer, is goose-summer, the summer meaning summer-film. Another derivation is from God and summer, the latter word being from the Romance samarra, 'a skirt,' from the legend that gossamer is shreds of the Virgin Mary's shroud, which she cast away when the water telem up to heaven she was taken up to heaven.

Gossan, a mining term for oxide of iron and quartz. See Iron.

Gosse, PHILIP HENRY, naturalist, was born at Worcester, 10th April 1810, and brought up at Poole. In 1827 he went to Newfoundland as a clerk, and was afterwards in turns farmer in Canada, schoolwas afterwards in turns farmer in Canada, school-master in Alabama, and professional naturalist in Jamaica. Returning to England, he published in 1840 the Canadian Naturalist, and after another stay in the West Indies settled in England to a busy life of letters. His early experiences and observa-tions supplied the material for his popular books, the righly illustrated Birds of Jamaica (1851) and A Naturalist's Sojourn in Jamaica (1851). His Naturalist's Ramble on the Deconshire Coast (1853), Aquarium (1854), and Manual of Marine Zoology (1855-56) inspired Charles Kingsley's Glaucus, and opened up a new branch of science to Englishuen. opened up a new branch of science to Englishmen. Gosse was elected a Fellow of the Royal Society in 1856, and over sixty monographs in its Proceedings are from his pen. His best-known work, the Romance of Natural History, appeared in 1860-62. Later and more severely scientific works were his Artinologia Britannica (1860) and the Prehensite Armature of the Papilionida (1885). In 1886 he placed in the lands of Dr C, T. Hudson the notes and drawings of a lifetime on the universe min straight. and drawings of a lifetime on the microscopic study of the Rotifera. Mr Gosse spent the last thirty years of his life in a retired South Devon villago, and died 23d August 1888.—EDMUND WILLIAM GOSSE, his only son, was born in London, September 21, 1849, was educated in Devonshiro, and became at eighteen an assistant-librarian at the British Museum, in 1875 translator to the Board of Trade. He travelled in Scandinavia and Holland, and made himself master of the languages of these countries. In 1884 he succeeded Mr Leslie Stephen as Clark lecturor in English literature at Trinity as chark lecturor in English Internance at Trinity College, Cambridge, a post from which he retired in 1889, having four years before received the honorary degree of M.A. from the university. During 1884–85 he lectured in Boston, at Harvard and Yale colleges, and in Baltimore and New York. Mr Gosse has tried various forms of verse, and possesses many of the qualities of the gennine poet. Among his writings in verse are Mudrigals, Songs, and Sonnets (1870); On Viol and Flute, lyrical poems (1873); King Erik, a tragedy (1876); The Unknown Lover, a drama (1878); New Poems (1879); and Firdausi in Exile,

and other Poems (1886). His chief writings in prose are in the field of literary criticism: Northern Studies, a series of essays on Scandinavian and Dutch literature (1879); Gray, in 'English Men of Letters' (1882); Seventeenth-century Studies, on Lodge, Webster, Rowlands, Herrick, Crashaw, Cowley, Etheredge, and Otway (1883); From Shahespeare to Pope, in which Waller is elevated to musual rank (1885); a short Life of Congree (1888); and an admirable History of Eighteenth-century Literature (1889). Besides these lie contributed many critical essays towards English Poets (1880-81), edited English Odes (1881), and a fault-less complete edition of Gray (4 vols. 1884). prose are in the field of literary criticism: Northern

Gossypium. See Cotton.

Got, FRANÇOIS JULES EDMOND, actor, was born at Lignerolles in 1822, entered the Conservatoire in 1841, and in 1844 made his début at the Comèdie Française in a servant's part. He rapidly pushed his way to the front rank, and was recognised as one of the finest comedians of his day. From 1850 to 1866 he was a member of the Comedie Française, playing with success such purts as Figaro in the older contedy, but in general regarded as the mainstay of the new dramatic school. In 1866, with the emperor's special permission, he appeared at the Odéon as Audré Lagarde in Augier's Contagion, and organised a company to carry the play through France. He has repeatedly played in London. In 1881 he was decorated with the cross of the Legion of Honour. His most finished performances were as Giluyer in Angier's Effrontes and Fils de Giboyer, and as Bernard in Les Fourchambautt.

and as Bernard in Les Fourchambault.

Gotha, a town of Germany, alternately with Coburg the capital of the duchy of Saxe-Coburg-Gotha, stands 31 miles W. by S. of Weimar, on the northern outskirt of the Thuringian Forest, and is a handsome, well-built town, with fine parks. The principal public building is the eastle of Friedeustein, built in 1648 on the site of a former one, on a rock 78 feet above the town; it contains a library of 200,000 volumes and 6000 MSS. and a very valuable munisumatic collection. MSS., and a very valuable numismatic collection. MSS., and a very valuable numismatic collection. The new museum (1878), in the Renaissance style, now harbours the picture-gallery, in which Cranach, Van Eyek, Holhein, Rubens, and Rembrandt are represented; a very excellent cabinet of engravings; a natural history collection; collections of Egyptian, Roman, Greek, and German antiquities; and a Japanese and Chinese museum. A new observatory was built in 1874. Gotha is an active industrial town, the principal mannfactures being shoes, fire-engine pipes, sugar, and factures being shoes, fire-engine pipes, sugar, and toys. Gotha sunsages have a widespread celeb-rity. Several hundreds of designers, engravers, printers, and colourers of maps are employed here toys. renters, and colourers of maps are employed after in the large geographical establishment of Justus Perhies (q.v.), who also publishes the Almanach (q.v.) de Gotha. Pop. (1875) 22,928; (1885) 28,100. See Beek, Geschichte der Studt Gotha (1870).

Gotha, Duchy of. See SAXE - COBURG-GOTHA.

Gotham, Tales of the Men of, a collection of jests, in which the people of Gotham, a village in Nottinghamshire (7 miles SSW, of Nottingham), are represented as saying and doing the most foolish things. These tales are similar to the Asteia, or facetive, ascribed, without authority, to the 5th-century Alexandrian philosopher Hierocles. The stories seem to have been first printed about the The stories seem to have been first printed about the middle of the 16th century, under the title of Merrie Tales of the Mad Men of Gothum, gathered together by A. B., of Phisicke Doctour; but they had been onally enrront in the time of Henry VI., reference being made to 'the foles of Gotam' in the Towneley miracle-plays, the only known MS. of which was written about that period. The initials 'A. B.' of the putative compiler were doubtless intended by the printer to signify Andrew Boorde (q.v.), who was popularly regarded as 'a fellow of infinite jest.' But there is no reason to suppose that Boorde had any hand in the work, his initials being placed on the title-page—as also on that of the Jests of Scogin—in order to promote its sale. Long before the men of Gotham were saddled with the uncuviable reputation of being typical blockheads similar jests had been told at the expense of the people of Norfolk, as we learn from a enrions Latin poem entitled Descriptio Norfoleiensium, written in the 12th century by a mouk of Peterborough, which is printed in Wright's Early Mysteries and other Latin Poems. In this 'poem' occurs the familiar jest of the man who was diding on horseback with a sack of meal, and considerately placed the sack on his own shoulders to lighten the horse—a story which reappears in the Gothamite drolleries and in the Hagarrares of the Sieur Gaulard, by Etienne Tabourot (1549-90), and which is at the present day current in Ceylon.

The Gothamite jest most generally known is that of the attempt of the villagers to hedge in a cuckoo, so that it should 'sing' all the year round. Among other witless exploits they tried to drown an eel that had eaton up all the fish in their pond; they fastened their rents on a haro which they had caught, and sent it off to their landlord; a smith burned down his smithy by thrusting into the thatch a red-hot ploughshare, to destroy a wasp's nest; and twelve of them went a fishing, and before returning home one counted their number to see whether all were safe, but omitted to include himself, whereupon they weened that one of them was drowned, and were lamenting this misfortune, when a traveller coming up, and learning the cause of their distress, soon set their minds at ease. Such jests are—mutatis mutandis—common to almost all the races of maukind, from Iceland to Japan, from Ceylon to the West Highlands of Scotland; and it is curious to find that the inhabitants of some particular district or village are popularly held up as arrant simpletons. In Britain, hesides the men of Gotham, the 'carles of Austwick' in Yorkshire, the villagers near Marlborongh Downs in Wilt-shire, the 'gowks of Gordon' in Berwiekshire, and the folk of Assynt in Sutherlandshire; in Gerthe folk of Assynt in Subhermanshire; in Germany, the Schildburgers; in Holland, the people of Kampan; in Belgium, the townsfolk of Dinant; in France, the inhabitants of Saint-Maixent, are credited with all sorts of absurdities. The citizens of Abdera, Sidonia, &c. were the noodles of the ancient Greeks, and not a few of the so-called jests of Hiorocles reappear in our early English collections of facetiae, with a blundering English collections of facetiae, with a blundering Welshman or Frenchman in place of the pedant of the Astria, and in more recent compilations-'Joe Miller' and its congeners—the conventional Irishman or Highlander. The similarity of simpleton stories in countries far apart at once suggests the question of their origin and diffusion, as in the case of popular tales generally. No doubt in many instances they sprang up independently, for human nature is everywhere much alike; but it is equally certain that a considerable number have been borrowed by one people from another, sometimes imported orally, most frequently taken from written sources. But however widely modern scholars may differ in opinion regarding the genealogy of popular fictions, their virtual identity among divers races is an interesting evidence of the kinship of man.

The Tales of the Mad Men of (Jotham continued to be issued in chap-book form down to the second decade of the 19th century. The first reprint of the original work was made in 1840, with an introduction by Mr J. O. Halliwell. The Tales were also printed in W. C. Hazlitt's Shakespeare Jest-books (1864); in John Ashton's Chap-books of the

Eighteenth Century (1882); and in R. H. Cunningham's Amusing Prose Chap-books (1889). For a compendious collection of simpleton stories—of which the Gothamite tales form but a trifling part—sec W. A. Clouston's Book of Noodles (Loud. 1888), which will be found to contain references to all the important books dealing with the subject, oriental and other. See also W. J. Thoms, in the Foreign Quarterly Review (1837, No. 40); and Deutscher Volkshumor, by Moritz Busch (Berlin, 1877).

Gothard. See ST GOTHARD.

Gothenburg (Swed. Góteborg), next to Stockholm the most important town of Sweden, stands at the month of the Gota, in 57° 42′ N. lat. and 11° 58′ E. long. Although originally founded by Gustavns Adolphus in 1618-21, the town, in consequence of numerous fires, is quite modern—regularly built and clean, with several canals, crossed by numerous bridges. The harbour is excollent, and seldom obstructed by iee. The few buildings which deserve special mention are the exchange, cathedral, and town-hall. There is a museum (art, zoology, industry) besides a fine garden belonging to the Horticultural Society. The more important industries embrace shipbuilding, iron-working, sugar-refining, the manufacture of matches, paper, wood pulp, and porter, and herring-fishing. The exports consist principally of iron, timber, grain, butter, matches, paper, wood pulp, zine ore, hides; the imports of coal, iron, salt, flour, grain, machinery, oils, rice, wines and spirits, and sugar, the annual value of imports and exports being each about 3 millions. The port is entered and cleared by about 5070 vessels of 1,815,380 tons burden every year. The commercial importance of Gothenburg dates from the Continental blockade of 1806, when it became the chief British depôt in northern Enrope. The town has given its name to the Gothenburg Licensing System, which originated here in 1865. All the wine and spirit shops are kept by a company licensed by salaried managers; all profits remaining after the company has been allowed five per cent on its capital go into the town treasury. See Licensing Laws. Pop. (1877) 71,707; (1888) 99,647.

comprised the various styles of architecture which prevailed in western Europe from the middle of the 12th century till the revival of classic architecture in the 16th century. The term Gothic was at first bestowed by the Renaissance architects on the medieval styles as a term of reproach. This epithet they applied to every kind of medieval art which had existed from the decline of the classic taste till its revival, all other styles being by them considered as barbarous and Gothic. The name has now, however, become generally adopted, and has outlived the reproach at first implied in it. It has also become limited and defined in its application. During the 19th century the arts of the middle ages have been attentively studied, and their origin and history carefully traced; and as the knowledge of these styles has increased, a feeling of admiration has succeeded to that of contempt, and Gothic now ranks as one of the noblest and completest styles of architecture.

Origin.—The origin of Gothic architecture has given rise to many very ingenious speculations. It has been said that the style was copied directly from nature; that the pointed arches and ribs of the vaults were imitated from the overarching branches of trees; and that the stems of an avenue were the originals of the pillars of the Gothic aisles. Others have strenuously maintained that the invention of the pointed arch was a mere accident, arising from this form having been observed in the interlacing of the circular arches of a Norman

arcade. It has also been stated that the style was imported from the East during the Crusades, and that the medieval architects had but little to do with its erigin. More eareful study of the Gothie buildings which remain to us has dispelled these fanciful ideas, and settled the origin and progress of the art on historical as well as internal evidence.

of the art on historical as well as internal evidence.

To trace Gothic up to its primary elements we have to go far back in the world's history. Many diverse styles have prevailed at different epochs and in different countries, and the later styles have invariably been influenced by those which preceded them. All the various styles of architecture may, however, be classed under two groups, the representatives of which are Greek architecture and Gothic architecture. These are the two typical styles, and in them are contained and exhibited in a very pure form the elements from which all other styles are produced. This is true in the same sense as it is also true that all things in nature are derived from a few primary elements. But as there are many varieties in nature, so there are many developments of the two typical forms of architecture, all

of which may be classed as styles.

The principles which underlie the two great divisions of architecture are structural in character; for the decorative features of all true styles are founded on the construction. The first of these divisions is distinguished by the employment of the horizental beam as the method of spanning the horizental beam as the method of spanning openings; while in the other the arch is the means used for the same purpose. All other specific differences of style are subordinate to these leading factors. Of these divisions Greek architecture is accepted as the highest type of the brabeated style—i.e. the style whose principal feature is the straight lintel; Gothic, as the type of arcutted architecture, in which the wolds are spanned by arches (These twice) forms voids are spanned by arches. These typical forms present many variotics, Roman Architecture (q.v.) being the transitional form between them. The trabeate form of construction was common to the primitive inhabitants both of Greece and Italy.
The early Romans' buildings were therefore trabeate in principle, and their exteriors were decorated with columns crowned by straight architraves and cornices. But in course of time they gradually introduced inside these, and hidden from view, a real construction with arches and vaults. constructional elements had long been in use amongst the Etruscans in Italy for drains, bridges, gateways, and other utilitarian purposes, and by slow degrees they obtained recognition as architectural features in the clevations. Their use gradually extended, especially in the construction of in-teriors, and by means of vaults the Romans were ablo to roof in large areas without encumbering the floor with pillars. This was found to be a very advantageous and lasting system of construction, and under the empire was carried out in many important examples, as, for instance, in the baths of Caracalla and Diocletian, the Basilica of Maxentius, &c. In their works of public utility, where use, not decoration, was the chief object, the Romans always adopted the arch as the fittest mode of construction—as in their Aqueducts (q.v.), bridges, &c. The arch thus came gradually more and more into use; and about the time when the barbarians first overran the provinces the archated form of construction was universal, and some attempts had been made to conform the trabeate decoration to the circular arches by bending the architrave round the curve—as in the palace of Diocletian at Spalato in Dalmatia.

To the Romans, therefore, is due the introduction of an arcuated construction with a well-developed internal, and a partially-developed external, decoration. The early Christians adopted their forms of

construction and decoration from the Romans. They were also indebted to them for the plans of the buildings which became the types of the Christian sacred chilices during the middle ages. There was no new style created by the early Christians, Their buildings were all founded on Roman design or Roman court-house and market-place, was found to be admirably adapted for early Christian worship, and the general opinion has hitherto been that the church was derived from the basilica. But this view has been combated by Professor Baldwin Brown in his work From Schola to Cathedral (1886), in which he derives the form of the nave from that of the schole, or halls of meeting of guilds permitted under the empire, amongst which the burial societies of the Christians were numerous; whilst he attributes the apse, a very prominent feature in early churches, to the memorial celler erected by pagans and Christians alike in the cemeteries, and afterwards introduced along with the bodies of saints into the churches. There can be no doubt, however, that the circular temples were the prototypes of the Christian Baptisteries (q.v.) which usually accompanied the basilicas. In erecting their buildings the Christians not only adopted the plans and mode of construction, but used the actual materials of the buildings of the Romans, many of which had been destroyed by the barbarians. Where such materials were abundant -as in Rome and central Italy-the early Christian architecture very closely resembled that of the Roman buildings which had preceded it. But in more remote districts the builders, finding no readymade materials at hand, had to design and prepare now ones. In doing so they followed as closely as they could the Roman originals, but their buildings partook more of the constructional than the decorative elements of Roman architecture. The Roman ornament thus dropped out of use; and when, in process of time, decoration was desired, each new people followed its own ideas. The traditional Roman decoration thus became to a great extent lost, and new styles developed. In this way the Tentonic tribes introduced into their architecture the scenes of lunting and lighting in which they rejoiced, the ornament showing the figures of animals and men intermixed with the acantlms leaves and other foliage of Roman design.

The different forms of vaulting developed by the Romans were followed throughout the empire during its decline, but gradually special forms were adopted in the different provinces. Thus the architects of the East preferred the dome as the distinguishing feature of their style, and those of the West retained the plain tunnel-vault. The former style is called Byzantine (q.v.), and has been the type of all Eastern medieval architecture; and the latter Romanesque (q.v.), and has been the origin of all the medieval architecture of western Enrope. This Romanesque style varied much in different provinces—being more Roman in type in central Italy and Provence where Roman examples abounded, and more Gothic on the Rhine and in Switzerland and Lombardy where the Tentonic elements prevailed. Roman forms were still adhered to in the Gothic provinces as late as the 9th century, when we find Charlemagne erecting his great mausoleum at Aix in imitation of San Vitalo at Ravenna, which was itself derived from a Roman original.

History.—The various modifications in different countries all contributed to the general progress of the art; but, as might be expected, it is to the banks of the Rhine where the successors of Charlemagne chiefly dwelt that we must look for the first step in the development of Gothic architecture.

The following short sketch of the history of the vaulting will show how this occurred.

The Roman basilicas, and, like them, the early Christian churches (for ground-plan see the article Basilica), were divided into a central arded from the latter by one or two rows of columns on each side. These columns carried columns on each side. arches on which rested the side-walls of the nave, which were carried sufficiently high to clear the roofs of the side aisles, and admit windows to light the central nave. This row of windows afterwards became the Gothic Clerestory (q.v.). At the east end of the nave was a great arch leading into an open space, in the centre of which was the agree. open space, in the centre of which was me have.

The latter was semicircular in plan, and was usually roofed with a vanit in the form of a semi-dome. This feature was also afterwards more fully developed, and surrounded with radiating chapels in Gothic churches. The nave and side-aisles were originally roofed with wood, but, owing to their frequent destruction by fire, it became necessary to cover the churches with a more enduring kind of construction. It was then attempted to introduce raulting; but the skill of the workmen had degenerated, and many efforts were needed before a system suitable for the requirements of the period and within the capacity of the builders was arrived at. But, as we shall jnesently see, when the principle of pointed vanlting was once grasped, the development of the style followed with astonishing rapidity. To trace the progress of vanlting from the early simple tunnel-vault copied from the work of the Romans to the fully-developed and magnificent groins of Gothic cathedrals is a most interesting inquiry; and indeed includes the history of the development of Gothic architecture. There is one consideration which will help to emperors who built the splendid vanits of the Roman emperors who built the splendid vanits of the baths, and who had a subdued world at command, materials and lubour were of small consideration. They could therefore afford to build in a style which required perfect materials and workmanship. But medieval princes and bishops could obtain neither. To economise these, therefore, the utmost skill and attention were required. It was necessary to avoid those large and expensive materials of which the Romans were so lavish, and to adopt the simplest and oasiest forms of construction.

The lirst vaults tried were simple semicircular tunnel vaults. It was found that these, besides being very gloomy, required very massive walls to resist their thrust. An attempt was then made to relieve this thrust by transverse arches (a, a, lig. 1) thrown across—at intervals—under the tunnelvault, to act as strengthening ribs. This idea was

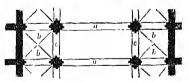


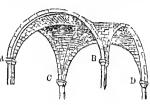
Fig. 1.

also borrowed from Roman precedent. Buttresses with a slight projection were applied outside to abut the transverse arches, and a beam of wood was sometimes introduced at the wall-head from buttress to buttress to assist in opposing the thrust of the vault.

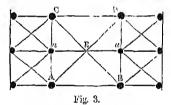
This was the first attempt to concentrate the weight of the vault on single points. In the side-aisles, where the span was small and manageable, the Roman intersecting vaults (b, b, fig. 1) were !

used; and as the main roofs with their tunnel-vaulting were found very gloomy and ill lighted, it was considered desirable that similar intersecting vanits should be used to cover them also, so as to admit of the clerestory windows being raised in order to light the vaulting. But how was this to be managed with the inferior materials and workmanship at command? If the transverse arches AB, CD (fig. 2)

are semicircular, and the side-arches AC, BD the same-the vanlt being formed by two intersecting cylinders — then the intersecting grows AD and



CB must be Fig. 2.
elliptical. This
was a dillicult form of construction; the medieval builders found it easier to construct the groin or diagonal arches of a circular form with radius EA (fig. 3), and to fill in the triangular spaces ABE, &c., with slightly domed vaults. These semi-(ug. 3), and to nit in the triangular spaces ADE, &c., with slightly domed vaults. These semi-circular edges on groins gradually came to form independent ribs. At first they were only marked by a bead on the angle, but being the chief constructional element of the vaulting they soon came to be distinctly separated from the rest of the vault as independent members with the name of aroin ribs, the development of which played so important a part in Gothic vaulting. When the space to be covered was square the above form of vault was found to answer, and each bay of the nave usually included two bays of the side aisles, as in fig. 4. But this arrangement looked awkward externally, the windows of the elerestory not grouping well with those of the side-ai-les. A transverse arch (a, a, fig. 3) was then introduced, carrying up the design from the nave piers to the vaulting.



This form of vault is called hexapartite. above varieties of vanlting were fully developed during the 11th and 12th centuries in the round-arched styles of the Rhine.

In France these forms were also tried; but it was found that the semicircle is not a good form of arch unless loaded on the haunches, many of the churches which were vaulted in this manner during the 11th century having to be buttressed or rebuilt in the 12th and 13th centuries. In Provence (where the Roman influence continued to be strongly felt, owing to the large number of Roman buildings still surviving in the country) the tunnelvault (lig. 4) was in use probably as early as the 9th or 10th century. But the form of the vault adopted then differed from that of the Romans in being pointed instead of round. The pointed form may have been borrowed from the Moors in Spain, by whom it was used as a decorative feature, but it was undoubtedly adopted in Provence as a simply-constructed method of vaulting. This form of arch was thus probably suggested in the 12th century to the architects of the north of France, who at once saw how well it would overcome the

difficulty of the yielding of the hannehes in the semicircular arch. They were thus lcd to the adoption of the pointed form for their transverse arches as a structural expedient, and still retained the semicircular form in the groins. The next question which engaged attention, and the solution of which led to the further use of the pointed arch, was the

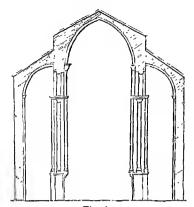
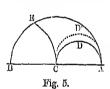


Fig. 4.

vaulting of oblong spaces. This had been tried with semicircular arches, but it was found that with that form the vault would require to be very much domed—the diameter of the arches c, c (fig. 1) being so much smaller than that of a, a—whereas by using pointed arches, of different radii, for the transverse and side arches all might be kept to about the same height. This is more fully explained by fig. 5. If AB be the dianester of the transverse arch ($\alpha\alpha$, fig. 1) and AC that of the side arches (cc), it is clear that the semicircular side arch ADC cannot reach the height





of the transverse arch AEB, even when stilted as at D'. But in the pointed arch CEB the same diameter rises to very nearly the height of the transverse arch. The pointed arches ACB and A'CB' (fig. 6) show how easily arches of this form, whatever their diameter, can be carried to the same height. By the introduction of this new form of

arch the vaulting was strengthened, and the thrust brought to bear steadily on single points.

We have now traced the history of vaulting from the time of the Romans to the 12th century, when the principles of Gothie pointed vaulting were fully developed; and we have dwelt particularly on this subject, because it includes the principles which regulated the whole of the Gothic style. Gothic regulated the whole of the cotine style. Cotine was not the invention of an individual, but a necessary growth—a gradual development from structural requirement. This is clearly the case with regard to the vaulting, as we have endeavoured to show above, and the same might be record recording every member of the style. Thus proved regarding overy member of the style. it might be shown how the ribs became gradually more decided, expressing the part they bore in the support of the roof; how the navo piers or pillars were subdivided by degrees into parts, each shaft bearing on a separate cap a separate member of the vaulting; how the buttresses were developed as

they were required to resist the thrust of the groins concentrated on points; and how the flying but-tresses were forced upon the Gothic architects much against their will, as a mode of supporting the

arelies of the roof.

The history of the flying buttress is carrious. The thrust of the tunnel-vault was sometimes resisted by half-tunnel-vaults over the side aisles (see fig. 4). The latter, therefore, required to be high, and a gallery was usually introduced. In the Narthex at Vezclay (fig. 7) we have this gallery with the vaulting used as a counterpoise to that of the central vault. This is a line example of vaulting in the transition state, that of the gallery resisting the main wallt, as in fig. 4, and being at the same time ground.

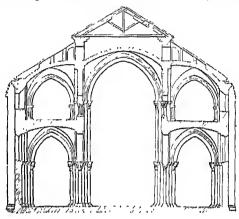


Fig. 7.

This leaves rather a weak point opposite the trans-This leaves rather a weak point opposite the transverse arches, to strengthen which the part of the semi-tunnel-vault (fig. 4) opposite the transverse arch is left standing, although the rest is altered by the groning. At Vezelay (fig. 7) this arch timidly shows itself as a small flying buttress above the roof. It is easy to see how this idea would gadually develop itself into the bold 'are-boutant' of a later date. The galleries were, in later examples, dispensed with to admit of larger elevertory windows. dispensed with to admit of larger clerestory windows, and the flying buttresses were left standing free. The architects finding them indispensable, then turned their attention to render them ornamental. Pinnacles may also be shown to owe their origin to their use; they acted as weights to steady the buttresses and piers. We shall, under their separate heads, point out how each element of Gothic architecture was in the strictest sense constructional, the decoration being in harmony with its actual use, or as Pugin has said, 'decorated construction, not constructed decoration.'

The full development of Gothic vaulting, which was the forerunner of the whole style, was first earried out in the royal domain in France about

the middle of the 12th century.

The Normans had settled in the north of France more than two centuries before this, and had applied their talents and the fruit of their conquests to the victories. In doing so they followed out the roundarched style, and brought it forward by a great stride towards true Gothic. See NORMAN ARCHI-TECTURE,

South of the royal domain, in Burgundy, there had existed for centuries great establishments of monks, famous for their architecture. The abbey of Chiny was their central seat, whence they sent ont colonies, and huilt abbeys after the model of the parent one. The style in which they worked was also an advanced Romanesque, but different

We have already seen from that of the Normans. that another school existed in Provence; and in Aquitaine, Auvergne, and Poiton still further varieties of Romanesque were developed.

Between these provinces lay the royal domain. Owing to the weak state of the kingdom, arehitecture had hitherto made little progress in the Isle of France. About the beginning of the 12th century the monarchy revived, and for the next two eenturies the royal domain was governed by wise and powerful monarchs, who succeeded in re-establishing the royal supremacy. A new impulse was thus given to the literature and arts of the country, by which architecture profited largely. From the state of rnin into which the kingdom had fallen, there were scarcely any churches existing worthy of the new state of things. Novel and great designs were formed: hitherto almost all the important churches of France belonged to the abbeys; now, under the royal patronage, eathedrals began to be built. The bishops, envious of the power of the monks, lent their powerful aid, and the whole of the laity, especially in the towns which were now emancipatespecially in the cowins when were now entaller paring themselves and forming independent communes, joined heartly in the work. With such a universal impulse, no wonder that architecture took a great stride and new forms were introduced. It is to this period and people that we owe the earliest development of the pointed Gothie style.

We have already seen at Vezelay how nearly the

Burgundian monks had approached to Gothic. To complete the development it only required the side walls and vaulting of the nave to be raised, so sate admit of windows over the roofs of the side-galleries; and the flying buttresses to be raised with them, so as to receive the thrust of the vanlt—the lattor being constructed with pointed groin rils, and the side and transverse arches carried to the height of the groins. The lay architects of the royal domain soon accomplished this step, and the now style spring up and progressed with the most astonishing rapidity.

The earliest example we have of the fully developed Gothic style is the cathedral of St Denis, in which are deposited the remains of the kings of France. It was founded by the Abbé Suger in 1144. The cathedral of Notre Dame of Paris 400n followed, and almost contemporary with it arose the magnificent eathedrals of Chartres, Rheims, Amiens, Beauvais, Bourges, and a host of others.

Another cause which tended much to hasten the progress of the style was the invention about the same time of painted glass (see GLASS, PAINTED). The Romanesque architects had been in the habit of decorating their churches with frescoes and other paintings; but this new mode of introducing the most brilliant colours into their designs was at once seized upon by the northorn architects. The small round-arched windows, which were still in many interacts retained instances retained long after the pointed arch had become usual in the vaniting, no longer sufficed when lilled with stained glass to light the churches. They were therefore enlarged, two or even three were thrown into one, divided only by mullions; this compound window was again increased until the compartment of the clerestory became almost wholly absorbed. The architects were then forced to conform the arches of their windows to the pointed outline of the side-arches of the vaulting. This desire for more and more space for stained glass was the origin of the window-tracery which forms so beautiful a feature of the style. It is the last attenuated remains of the wall space of the days of the content of the style.

clerestory, which was at last entirely absorbed.
Fig. 8, from Notre Dame, Paris, is a good illustration of the mode of progress of French Gothic.
The left-hand portion of the elevation shows the

kind of fenestration adopted. The clerestory windows are small; and, in order to admit more light, the windows and vault of the gallery are kept very high. This was the original design; but during the construction of the cathedral the importance of stained glass had become so great that the design was altered so as to give larger windows in the clerestory for its display, as shown on the righthand portion of the clevation. The gallery is at the same time reduced to a mere triforium with very small windows, and the aisle windows are greatly enlarged. The upper or clerestory window also shows the simple early form of tracery; that in the aisle window being later and more advanced.





Fig. 8.

Fig. 0.

Fig. 9 shows two bays from Tournay Cathedral, and is a good specimen of the mode in which the whole space of the side-walls was made available

for window-tracery and stained glass.

The further history of Gothie architecture in France is simply the enthusiastic following out, to their furthest limits, and in the most logical and artistic manner, of the principles above indicated, on which the early architects had unconsciously been working when they originated the style. So long as the Gothic architects worked on these principles they advanced and improved their architecture. When, however, the style had become fully developed and matured (about 1300 A.D.) the spirit of progress died. No new features were developed. The architects seemed to think that in its main elements their style was complete, and contented themselves with continuing the tradi-tional style of their forerunuers, and pushing to their extremest limits the principles handed down to them. They became proud of their scientific knowledge, and of the accuracy with which they could calculate and provide for the thrusts of the different arches, and the artistic element became subordinate to the engineering. The height of the cathedrals was extended till, at Beanvais, it exceeded the power of the architects to prop up the vanlting. The system of luttresses and pinnacles was developed with the utmost skill, till at last the original simplicity and repose of the designs were lost, and the exteriors presented a scientific but confused system of scaffolding and propping-up in stone (see BUTTRESS). The simple and beautiful forms of the early tracery became altered into all manner of flowing curves, graceful but unmeaning, in the Flamboyant period (q.v.); and, in short, the art became lost in mere eleverness of design and

dexterity of execution, and the architect's place

was usurped by the freemason.

It is in the cathedrals of the 12th and 13th eenturies, above referred to, that we find the noblest development of the Gothic style. Everything tended to this result. The nation was united in the effort—all the science, all the arts, all the learning of the times were centred in the church. In it, and that almost exclusively, the sculptor, the painter, the historian, the moralist, and the divine, all found scope for the expression of their ideas on the sculptured walls, porches, and niches, or the painted windows of the cathedrals—the churches of the people. The development of the decorative features progressed simultaneously with that of the constructional. The Roman acauthus and other enrichments were long followed, but gradually modified (as above mentioned) by Teutonic inlinence as shown in the hunting and fighting, as well as religious scenes represented in the 'historied' capitals and sculptures of their architecture wherever they penetrated. This style of carving became traditional, and was adhered to for centuries by the monastic orders. But at the revival of the 12th century these traditional forms were gradually departed from, and the architects sought inspiration for their sculpture directly from nature. At first the foliage was treated conventionally, but gradually came closer to nature, till in the completed style of the 14th century cach leaf and flower exactly initiated the shape and embodied the spirit of the natural type. Mouldings, buttresses, pinnacles, and all the smaller features following the rule of nature were infinitely varied and beautiful. These will be treated of under their separate heads.

The progress of the Gothie style in other countries is no less remarkable than in France. At no time in the world's history did any style of architecture over spread so wide, or give rise in such a short time to so many splendid buildings. No sooner had the style been invented in the central provinces of France, than it immediately spread over the west of Europe, superseding all other styles, and producing similar splendid buildings wherever it went. We shall note shortly a few of the peculiarities of the style in Eugland, Germany, and Italy. It

We shall note shortly a few of the peculiarities of the style in England, Germany, and Italy. It spread also over the south of France and Spain; but in the latter countries it presents the character of an imported rather than that of a native

or freely-adopted art.

English Gothic.—At the Conquest in 1066 the Normans introduced their round-arched style, some fine specimens of which still exist both in England and Scotland—St Cross, near Winchester; Durham Cathedral; Kelso and Jedburgh Abbeys, &c. But these buildings are not copies of those of Normandy. The English have always, in adopting styles, given them a national impress. As it was with the Norman, so it was to a still greator degree with the pointed Gothie, which was introduced into England about 1174 by William of Sens, who superintended the rebuilding of Canterbury Cathedral. The English architects soon began to follow out a pointed style of their own. They borrowed much from France, and worked it out in their own way, forming what is now called the Early English style. The differences between the early Gothic of France and England extend to almost every detail. The mouldings, bases, caps, pinnaeles, buttresses, and foliage of the latter are all impressed with the early Gothic is one of unrest—a constant struggle forward. In England the effort after progress is not so distinct—that of carefulness and completeness prevails. In the plans of the cathedrals the differences are marked (see figs. 10, 11), as the accompanying plans of the eathedrals of Salisbury

and Amiens show. The eastern termination of a French eathedral or church is invariably circular ended or apsidal—a form derived from the early Christian apse. The English cathedral, on the contrary, has almost always a square east end. The French transepts have almost no projection beyond

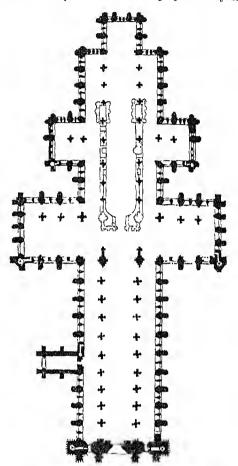


Fig. 10.—Salisbury Cathedral.

the line of the aisles; the English ones have great projections—Salisbury (q.v.) and Canterbury (q.v.) having two transcepts. The French cathedrals are short and very lofty; the English, long and comparatively low. The French buildings are perhaps the grandest and most aspiring, the English the most inished and picturesque.

The construction of the exterior of the 'elevet' or apsidal east end was a difficulty with the French and Germans, and, as at Beanwais and Cologne (q.v.), resembles an intricate and confused mass of scaffolding. One of the churches in which this picturesque feature is most successfully carried out is St Ouen, Rouen. The great complication of pinnaeles and flying buttresses which marks so many of the great French churches is here reduced to a minimum. This difficulty was avoided by the English square ends, which afforded scope for a large field of stained glass in a single great traceried window, as in most of the English examples.

The western portals of the French cathedrals, such as Rheims (see Doon) and Amiens (q.v.), are among the boldest and most magnificent features of their architecture. In these the English were

occasionally not far behind, as the western portals of Peterborough and York show; but the English portals are generally smaller and less effective than the French ones.

The outlines of the English cathedrals are usually yery picture-que and well balanced, the western

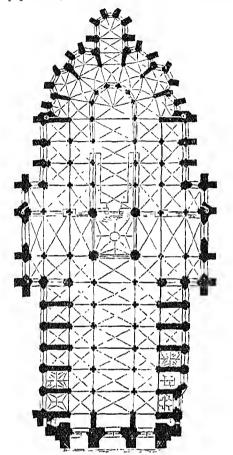


Fig. 11,-Amiens Cathedral.

towers grouping harmoniously with the central, and in this respect the English have the advantage. The vaniting of the French churches is almost always quite simple in design, but in the application of vaulting the English carried out their own ideas. They were always fond of wooden roofs, and probably this may have led to the invention of the many beautiful kinds of vaults which form so fine a feature of English Gothic (see FAN-TRACERY). In England the style lasted longer than on the Continent, being retained till the time of Henry VIII. about the middle of the 16th century.

The Germans were nearly a century in adopting the pointed style after its invention in France; and when it was introduced it retained the appearance of a foreign importation. It never was so completely naturalised as in England. The so-called beauties of the German Gothic are, for the most part, to be regarded rather as excellent specimens of masonry than as artistic developments of the style. The open-work spires, for example, which are of frequent occurrence in England, are fine pieces of construction, and have a striking effect; but from the first there is a tendency to commit the work to masons, who rejoice in displaying their manual dexterity. The later Gothic in

Germany is the most splendid development of the stone-cutter's art and the draughtsman's ingenuity; these run riot, while the artist is entirely wanting. The distortions of fig. 12 may serve as an example.

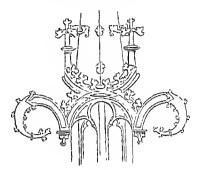


Fig. 12.

The Gothic style forced its way also into classic Italy, but there it was never understood nor practised in its true spirit. It was evidently an imitation from the beginning. The Italian architects tried to vie with those of the north in the size of their buildings, some of which, such as San Petronio at Bologna and Milan Cathedral, are enormous. The former illustrates the defects of Italian Gothic. The arches are very wide, and there are few piers. There is therefore a bare and naked effect, which is not compensated for by any richness of sculpture or colour. There is a want of scale about Italian or colour. There is a want of scale about Italian Gothie buildings, as there is about those of Italian classic architecture, both ancient and modern. Size alone is depended on for producing grandeur of effect. No attempt is made to mark the size, and give a scale by which to judge of the dimensions of the buildings in those styles. A large classic or the mindings in those styles. A large classic temple is simply a small one magnified. In true Gothic architecture the case is different. Not only are the general dimensions magnified in a large edifice, but also the parts are multiplied. The columns and shafts remain of the same size, but their number is increased. The arches are enlarged in proportion to the general dimensions, but the caps, bases, and monddings remain of the same edis, bases, and mondings remain of the same size as in a smaller building, and thus indicate the greater size of the arch. A true Gothic building of large dimensions thus tells its own greatness, but in a classic or Italian Gothic edifice the size has to be found out. Stained glass was little used in Italy. It may have been intended to decorate the walls, which otherwise have such a bare and cold appearance, with frescocs—as indeed is the case in a few examples. The church of St Francis, at Assisi, is the most remarkable building of this kind, and is a very interesting example of fresco-decoration (see FRESCO). Italian Gothic, however, was most successful, especially in Venice and Verona, in domestic edifices, the palaces of those cities being amongst the finest structures of their kind in Europe. The medieval monuments of Italy, too, are especially beautiful and appropriate. The towns of Italy, being early enfranchised, have also many municipal buildings in the Gothic

The towns of Italy, being early enfranchised, have also many municipal buildings in the Gothic style. These will be treated along with those of Belgium hereafter (see MUNICIPAL ARCHITECTURE).

We might, in the same manner, trace the Gothic style in all the other countries of western Europe; but its history is similar in all. It is in England and France that the true spirit of the style was most felt and the finest examples remain. Our space has not permitted us to enter minutely into the various styles of Gothic in cach country. The

more important of these will be treated separately (see Early English, Decorated, Perpendicular, Flamboyant).

We may, however, state generally that both in France and England the style had a complete existence—it was born, arrived at maturity, and died. When the spirit of the early architects had pushed the design to its utmost limits they rested from their labours, well satisfied with their splendid achievements. Their successors occupied themselves with forms and details, and with the perfecting of every minute part. The art finally passed away, and left architecture in the hands of trade corporations-masons, carpenters, plumbers, &c.who monopolised the whole work, and acted independently, to the exclusion of one directing mind. The result was as we have seen architecture became masonic skill, and Gothic was finally super-scaled by the revival of classic architecture in the 16th century. The Renaissance of the arts of Greece and Rome during the last two or three centuries has in the 19th century been followed by a revival of Gothic architecture. Even during the 17th and 18th centuries a few attempts were made 17th and 18th centuries a few attempts were made to resuscitate the old style in churches, and in the 18th century a bold effort in the direction of introducing it into domestic architecture was undertaken by Horace Walpole, Batty Langley, and others. But the posent revival may be said to have fairly commenced in 1819, when Rickman published his Attempt to discriminate the Styles of English Architecture, a very caroful and complete work, the conclusions of which have been generally adouted and adhored to. Other works generally adopted and adhored to. Other works by Pugin, Cotman, Britton, and others soon followed, illustrative of Gothic architecture both at home and abroad. One of the most prominent anyporters of the revival was Augustus W. Pugin (1812-52), who both by his writings and in his practice brought the Gothic style practically before the public in the first half of the 19th century. Since that time it has been greatly used, almost all our modern churches and many other public buildings being designed in the Gothic style. The names of Edward Barry, George Gilbert Scott, E. Street and Barrys are all because in contrast. Street, and Burgess are well known in connection with the Houses of Parliament, the Law Courts in London, and mimerous churches and cathedrals both in England and abroad. A reaction has within recent years taken place, especially in secular structures, but Gothic is still regarded as

secular structures, but Gothic is still regarded as the most suitable style for ecclesiastical edifices. In the United States classical models were generally followed, even in ecclesiastical architecture, till the building of Trinity Church, New York, in 1840, by Richard Upjolm—the first instance in which the Gothic style (English Gothic) was used with skill. Since then Gothic has been the prevalent style for churches; and a modified Gothic, mainly North Italian, has also been much used for civil buildings in the United States.

In France, the land of its birth. Gothic archi-

In France, the land of its birth, Gothic architecture has been very thoroughly studied, and its principles and beauties have been admirably analysed and illustrated, notably in the sylendid work by the late Viollet-le-Duc, Le Dictionnaire raisonné de l'Architecture française.

The beauties of Italian Gothic have also had their admirers, and have been charmingly described and illustrated by Ruskin. But this style has not

been much adopted in northern countries.

In the changes of fashion with regard to architecture Gothic may at present appear to be receding, but the study and elucidation of its principles have done much to modify men's views with regard to the elements of the art, and will doubtless con-tinue to influence the principles and practice of the architecture of the future.

See Bloxam's Principles of Gothic Architecture (1829) See Bloxam's Principles of Gothec Architecture (1829) 11th ed. 3 vols. 1882); Rickman's Gothec Architecture by Parker (1848); Britton's Antiquities of Great Britain (1835); Pugin's works, such as the Examples of Gothec Architecture (1835) and the Specimens, &c. (1823); E. Sharpe's Architectural Parallels (1848); Viollet-le-Duc, Dictonnaire (1854-69); Street's Brick and Marble of Middle Ages (1874) and Gothic Architecture in Spain (1869); Ruskin's Stones of Venice (1851-53); Fergusson's History of Architecture (1853-76) History of Architecture (1865-76).

Gothland (Swed. Gotaland and Gotarike), the southernwost of the three old provinces of Sweden, southermost of the three out provinces of Sweden, with an area of 35,803 sq. m. and (1884) a population of 2,595,194.—(2) A Swedish island (Swed. (tottland)) in the lialtic, 44 miles E. from the mainland, constitutes with Faro, Gotska Sando, and other smaller islands the province of Gottland or Wisby. Area, 1217 sq. m. The island consists mainly of terrace-like slopes of limestone, which was arealy shed, by all the backen by any appropriate the store arealy shed. are encircled by eliffs broken by numerous deep fiords, more especially on the west coast; the eastern parts are flat. The climate is mild. Next eastern parts are list. The chinate is until. Next to agriculture, the chief occupations of the inhabitants, 52,750 in 1885, are shipping, fishing, seal-fishing, fowling, and lime-burning. In the middle ages the island belonged to the German Hanscatic League, but was restored to Sweden in 1645. The capital is Wisby (q.v.).

Goths. The native name of the Teutonic people known as Goths (in Lat. Gothi, Gotthi) (sing. Guts); from the latter was formed the compound Gut-thiudu, 'people of the Goths.' Their earliest known abode was on the southern coasts and the islands of the Baltic. The island Guthland derives its name from the southern coasts and the islands of the Baltic. Gothland derives its name from thom. The Seandinavian traditions, reduced to writing in the 12th century, speak of a country on the Baltic called *Hreidhqotaland*, which must have owed its name to the branch of the Goths called in Auglo-Saxon poetry Hride, and (perhaps with otymologising corruption) Hrithgotan and Hrithas. The Harde are stated in an Anglo-Saxon poem (Wasith) to have had their home on the Vistula. Whether Goths ever inhabited the Scandinavian peninsula is doubtful; the 'Gothland' of Swedon is clymologically not 'the land of the Goths,' but 'the land of the Gants' (in A.S. Géatus), a distinct, though doubtless a kindred people.

The native tradition of the Goths, according to their historian Jordanis (6th century), represented them as having originated from Seandinavia. This tradition, however, is probably a mere development of the common Tentanic myth which placed the ercation of mankind in an unknown region beyond the northern sea, and has therefore no

historical value

The elder Pliny (died 79 A.D.) mentions the Goths (Guttones) in two passages of his Natural History, once in a mere enumeration of the Germanic peoples, and once in what purports to be a quotation from the Greek traveller Pytheas (4th eentury B.C.). If Pliny's citation be accurate, Pytheas referred to the Guttones as dwelling on Tymeas telerred to the Crubbnes as twening on the shores of an estuary called Mentonomon, and as trading in amber, gathered by the inhabitants of an island distant from them a day's sail. It has, however, been suggested that the people mentioned by Pytheas were the Tentones living near the month of the Elbe. In a Greek MS, it would be easy to misraed Tentones as Cuttours, and the former pane nuisread Teutones as Guttones, and the former name actually occurs in the coutext. But even if this be so, we may perhaps infer that in Pliny's time the 'Guttones' were a maritime people, as he quotes the supposed statements of Pytheas without any remark. A generation later the Goths (Gotones, Gothones) are spoken of by Tacitus, who says that among them the kingly power was greater than

COTHS 321

among the other Germanic peoples, though they still retained their freedom. He relates that in the reign of Tiberins a Marcomannic exile named Catualda, who was resident among the Gotones, Catuatua, who was resident among the Gotones, collected an army and made himself king of the Marcomanni. The indications given by Tacitus seem to imply that he regarded the Goths as the easternmost people of Germany (the boundary of which was the Vistula), and that their territory reached to the Baltie. Their southward emigrations must have commenced to a afterward emigrations must have commenced soon afterwards, for tions must have commenced soon afterwards, for the geographer Ptolemy (2d centry) assigns to the 'Gythones' a position in Sarmatia (on the right hank of the Visulla), divided from the sea by the Slavonic Wends. The history of their south-ward wandering is unknown, the story told by Jordanis being obviously mythical. What seems certain is that early in the 3d century the Goths, vastly increased in numbers by the accession of many conquered peoples, were occupying a territory north of the Black Sea and the Dambe months. north of the Black Sea and the Dambe months. The eastern portion of them received the distinctive names Ostrogoths ('East Goths') and Grenthungs ('dwellers on the saud'), while the western portion were called Visigoths ('West (toths') and Thervings (probably 'dwellers among the trees'). Mingled with the Goths proper, or adjoining them, were a number of other East Germanic peoples who, like them, had emigrated from the Baltic coasts. Chief among these were the Vandals and the Gephale, the neighbours of the Goths on the west and on the north respectively. The geographical position of the Hernli, Burgunds, Scirians, Rugians, position of the Heruli, Burgunds, Scirians, Rugians,

and Turcilings at this time cannot be determined. All these nations were often classed together under

the general name of Golhs.
In the reign of the Emperor Philip the Arab (248-49) the Goths are said to have been ruled by a king named Ostrogotha. (There is no strong reason for regarding this name as an etymological figment: it does not mean '()strogoth,' but is to be compared with such Tentonic names as Austrowald, Easterwine, Earcongota.) In his reign a war broke out between the (toths and the Roman empire; at the battle of Abritta the Romans were totally defeated, and the Emperor Decius and his son wero killed. For eighteen years the oastern provinces of the empire suffered terrible ravages from the Goths, but these calamities were avenged by the victories of the Emperor Claudius (thence sunnamed Gothieus). After the death of Claudius in 270, his successor Aurelian conceded to the Goths the province of Dacia, on condition of furnishing a body of 2000 men to the imperial army. Such of the native inhabitants as did not choose to remain as subjects of the Goths were provided with new settlements south of the Danube. With some interruptions, the peaceful relations between the Goths and the Romans continued for more than a hundred years. During this period the old names Visigoth and Ostrogoth received a new sense as expressive of a national distinction. The Visigoths or Thervings of later history are the descendants of the people established by Anrelian in Dacia; the Ostrogoths or Grenthings are the descendants of the Goths who remained in sonthern

Russia

In the 4th and sneceeding centuries writers who affected classicality of diction frequently applied to the Goths the obsolete names of Geta and Scythians. which in antiquity belonged to the inhalitants of the regions in which the Goths were now settled. Usually the Goths were regarded as the actual descendants of these historic peoples, and the name Gothi seems to have been imagined to be a corruption of Gette. In the 6th century Cassiodorns, followed by the Goth Jordanis. endeavoured to blend into one story the facts of Getic history, 229

taken from Herodotus and other classical writers, and the Gothic traditions of a migration from the extreme north. In modern times the hypothesis of the identity of Goths and Getre has been advocated by so distinguished a scholar as Jacob Grimm, but

is now generally rejected.

In the middle of the 4th century the Ostrogothic king Ermanarie established by conquest a powerful empire, extending from the Black Sea to the Gulf of Bothnia. About the year 375 this empire was subjugated by the Huns. The Visigoths, with a small portion of the Ostrogoths, escaped a similar fate by crossing the Danube, and placing themselves under the protection of the Roman empire. The oppression of the provincial governors soon provoked a revolt. The eastern emperor, Yaleus, collected a great army and marched into Thrace for the purpose of subduing the barbarians; but at the battle of Adrianople (August 9, 378) the Romans suffered a ruinous defeat, and Valens himself was killed. The Goths, however, were too and Theodosius, the successor of Valous in the empire of the East, and afterwards sole sovereign of the Roman empire, found it possible in reign of the Rollian captro, found to possible in a few years to bring back to their allegiance the whole (tothic people, excepting those who were under the yoke of the Huns. This result was not attained without great and dangerous concessions. The Visigoths received large grants of land in Thrace, and the Ostrogoths in Phrygia. were permitted to govern themselves by their own laws, and 40,000 of their warriors were embodied into a separate army (called feederati), receiving a high rate of pay. Many of their nobles also were promoted to high positions in the imperial service. So long as Theodosins lived these measures were successful in securing the loyalty of the Goths; but the excessive favour shown to barbarians who had so lately been enemies provoked serious dis-

The Goths thus incorporated into the Roman empire had for the most part been converted to Christianity; principally, it is believed, owing to the labours of the Arian bishop Wulfila or Ulphilas (q.v.), a Goth who had received a learned education at Constantinople, and who lived as a missionary among the Visigoths from 340 to 381. The new among the Visigoths from 340 to 381. The new faith was with extraordinary rapidity accepted, not only by the two great branches of the (tothic people, but by all the smaller nations of kindred race. For two bundred years the Goths remained faithful to the Arian creed taught by Wulfila and his disciples. Unlike the Vandals, who were adherents of the same sect, the Arian Goths were benowally distinguished by their freedom from honomrably distinguished by their freedom from bigotry. Although themselves the object of the most virulent religious hatred, they were, even at the height of their power, very seldom guilty of

persecution.

On the death of Theodosins in 395 the sovereignty of the Roman world was divided between his two sons, Arcadina becoming emperor of the East, and Honorins emperor of the West. One of the first acts of the ministers of Arcadins was to lower the pay of the Gothic soldiery. The Visigoths at once rose in rebellion, and, electing as their king a young officer of distinction named Alaric (q.v.), proceeded to overrun Greece. The emperor was compelled to to overrun Greece. The emperor was compelled to make terms: Alarie was made military governor of Eastern Illyricum, and remained quiet for three years, preparing for an irruption into Italy. In the year 400 he entered the peninsula, but apparently met with no great success. After being defeated by Stillahe at Pollantia (Fastay Sunday 400) he by Stilicho at Pollentia (Easter Sunday, 402), he retired to Illyria, receiving, however, a large sum of money from the Romans as the price of neace. A second invasion in 408, provoked by the

322 GOTHS

disregard of treaty obligations on the part of the Romans, had very different results. Stilicho was dead, and the barbarian soldiers of Italy, exasperated by official tyranny, deserted to the standard of Alaric in great minibers. Rome was thrice besieged; twice the city was saved by the submission of the senate, but on the third occasion it was taken by storm and delivered up to plunder. Although terrible excesses were committed by the Goths, the Roman writers speak with great admiration of the humanity and moderation displayed by Alaric himself. Honorius, seenre in the impregnable fortress of Ravemm, and encouraged by hopes of support from Constantinople, refused to come to terms, and Alaric was preparing to effect the entire subjugation of Italy, when his career was ent short by death in 410.

Alarie's successor, Atawulf, abandoned the design of conquering Italy, and led his people into southern Gaul. At Narbonne he married the daughter of Theodosius, the princess Galla Placidia, who had been taken captive by Alarie in Rome. On the approach of a Roman army under Constantins the Visigoths crossed the Pyrences into Spain,

where Atawulf was nardered in 415.

The next king, Wallia, submitted to the Romans, and in the name of the empire conquered nearly the whole of Spain. As the reward of his services, he received pennission to settle with his people in

the south of Gaul.

The 'kingdom of Toulonse,' founded by Wullia in 418, was increased by the conquests of his successors, until under Enrie (who died in 485) it included the whole of Ganl south of the Loire and west of the Rhone, as well as Provence and the greater part of Spain. The most noteworthy event in the history of this kingdom was the great battle fought in 451 on the Maunice plains near Troyes (commonly miscalled the battle of Chalons), in which the Visigoths under their king Theoderic (or Theoderid) 1, united with the Romans and the Franks, inflicted a crushing defeat on the vast army of the Huns under Attila (q.v.). Theoderic was killed, but the result of the battle was the dissolution of the Hunsish empire, and the salvation of European civilisation from the deluge of barbarism which had threatened to overwhelm it.

In the reign of Alarie II., the successor of Enric, the kingdom of Tonlouse came to an end. The Frankish king Clovis (Chlodovech, Hlodawsh), whose recent conversion to Catholic Christianity enabled him to give to a war of unprovoked aggression the specious aspect of a crusade against the hereties, invaded the Visigoth territories in 507. The battle fought on the 'field of Voelad,' near Poities, decided the sovereignty of Gaul. Alaric was killed, and the Visigoths abandoned to the conqueror all their territories north of the Pyrences, retaining of their Gaulish possessions only a small strip of country bordering on the Gulf of Lyons. The subsequent history of the Visigoths must be reserved until we have related the history of their

Ostrogothic kinsmen.

After their subjugation by the Huns in the later part of the 4th century, the Ostrogoths, Gepide, and the smaller 'Gothie' peoples appear to have adopted the nomad life of their conquerors, and they formed part of the vast harde which followed Attila into Gaul. On the collapse of the Hunnish dominion these nations regained their independence. The Ostrogoths settled first in the neighbourhood of Vienna, under their king Walamer, a member of the Amaling family, who traced their descent through Ermanaric and Ostrogotha to a legendary hera named Amala. Immediately after their emancipation the Ostrogoths are found occupying the position of mercenaries of the Eastern Empire. In 462 the friendly relations between Walamer

and the emperor, which had been for a time relinquished, were renewed, and Walamer's nephew, Theoderic, the son of Theodemer, a boy eight years old, was sent as a ho-tage to Constantinople, where he remained ten years, receiving the education of a Roman noble. Shortly after his return the Ostrogoths, pressed by famine, abandoned their homes, and migrated in a body towards the south-east. Their inroads in Mossia and Thrace caused great alarm at Constantinople, and the emperor was constrained to purchase peace by granting them permission to settle in Macedonia, and by bestowing on them large gifts of land and money.

permission to settle in Adactional, and by bestowing on them large gifts of land and money.

In 474 the young Theoderic became king of the
Ostrogoths. After fourteen years spent in petty
warfare, sometimes as the ally and sometimes as
the enemy of the Romans, he obtained from the
Emperor Zeno permission to wrest the dominion of
Italy from the usurper Odovacar (Odoacer, q.v.).
Like most of the military expeditions of the Goths,
the invasion of Italy was the emigration of an
entire people; and the number of persons who
accompanied the march of Theoderic was probably
not less than a quarter of a million. After a war
of five years the work of conquest was completed
by the expense of Ravenna and the submission of
Odovacar, who, it is said, was soon afterwards
brutally and treacherously murdered by Theoderic's

own hand.

Notwithstanding this evil beginning, the thirty-three years' reign of Theoderic in Italy was one of singular humanity and wisdom, and secured for the country a degree of tranquillity and prosperity such The historian as it had not enjoyed for centuries. Procopius, though a Byzantine courtier, pronounces him not inferior to the best and wisest of Roman emperors. The partisans of Odovacar received a general annesty; the necessary provision of lands for the Goths was carefully carried out so as to press as lightly as possible on the native population; the fiscal and judicial systems were toorganised, and all acts of extortion or injustice on the part of officials were sternly repressed. The Goths and the Romans continued to be distinct nations, each judged by its own tribunals and by its own laws, limited and supplemented by a new code containing a few provisions which were made binding on all the subjects of the kingdom. Catholies were granted entire equality with the adherents of the king's own faith; the Jews, in all other Christian lands the victims of oppression, enjayed under Theoderic full liberty of worship, and protection from all encroachment on their civil rights. It is impossible to read the official letters written in Theoderic's name by his Roman secretary, Cassiodorus, without the deepest admiration for the king's unwearied energy and enlightened zeal for the wolfare of his subjects. It is true that in the last three years of his life, when he was worn by uge and harassed by suspicious of widespread treason, his fame was tarnished by the judicial murders of Boethins and Symmachus, and by acts of oppression directed against the Catholic Church. But there have been few possessors of absolute power who, on the whole, have used it so

Theoderic died in 526, and his daughter Amalaswintha was appointed regent on behalf of her son Athalarie, then ten years old. When Athalarie died at the age of sixteen, Amalaswintha associated with herself in the kingdom her father's nephew, the base and cowardly Theodahad, by whose orders she was soon afterwards murdered. Theoderic had not long been dead before the disordered state of the kingdom testified to the incapacity of his successors; and the Ostrogothic power was threatened by a new danger in the amhition of the Emperor Justinian, who, not content

COTHS

with the formal acknowledgement of supremacy which had satisfied bis predecessors, was resolved to make Italy an integral part of his own dominions In 536 the great general Belisarius was sent for the purpose of conquering the country. The Gaths deposed Throdahad, and elected to the throne a distinguished soldier named Witigis, who, on his distinguished sounds in the deviation, married Amalaswindha's daughter Mataswindha. After four years Belisarius, though enormously overmatched in numbers, had subdued witiges and his queen prisoners, when he was recalled by Justinian's jealousy to Constantinople.

Soon after his return the oppression of the imperial representatives in Italy not only provoked into reals the Coths who had as builted to

into revolt the Goths who had submitted to Roman rule, but excited untiny among the Roman soldiers, who deserted to the enemy in great numbers. In a few months the new king of great numbers. In a low months the new king of the Goths, Hildibad, who had previously maintained a precarious footing in the north, found himself at the head of a powerful nemy. His career, however, was ent short by assassination; and after a short interregunan the Goths conferred the crown on his nephew Totila, otherwise named Badwila. After a struggle of a few years, in which Totila displayed not only hrilliant military talent, but a chivalrous generosity and humanity which extorted the ad-miration of his enemics, the imperial cause in Italy was felt to be desperate, and in 544 lelisarius was again sent to take the command of the army. But owing to the insuhardination of his afficers, and to other causes, he had little success, and after five years was recalled at his own request. The enterprise in which Belisarius had failed was accomplished by the aged canach Narses, who, in 552, plished by the agod ennuch Narses, who, in 552, anded in Italy at the head of a calossal army. The Ostrogoths suffered a crushing defeat at Tagina (Tadina), where Totila was killed. His successor, Teta, fell a few months luter in the lattle of Mous Lactarins, near Vesuvins. The remnant of the defeated army was suffered by Narses to march unmalested out of Italy; their subsequent fate is nuknown. In the course of the next two years the few outstanding Gothic garrisons surrendered, and Italy became a portion of the sons surrendered, and Italy became a portion of the Byzantine empire. The nation of the Ostrogoths had ceased to exist.

We now return to the history of the Visigoths. The conquering progress of Clavis, after the battle of Voclad in 507, was checked by the armed intervention of Theoderic the Ostrogoth, who compelled the Franks to leave the Visigoths in possession not only of their Spanish dominions, but also of a small tract of country in Gaul, including the cities of Carcassonne, Narbonne, and Nînes. The former Visigothic territories in Provence Theoderic aunexed to his own kingdom, and he assumed the nexed to his own kingdom, and he assumed the gnardianship of his infant grandson Amalarie, the son of Alarie II. During Theoderic's life the Visigothic kingdom was administered by him in the name of Amalarie; in Spain, however, his general Theudis practically reigned as a tributary king. After Theoderic's death Amalarie was acknowledged as sovereign of the Visigoths, but his direct rule was contined to the Gaulish dominions, Thendis still retaining the real authority in Spain. A defeat by the Faurks having caused Amalarie to A defeat by the Franks having caused Amalarie to cross the Pyrenees, he was intrdered in 531 by order of Thendis, who then assumed the crown, and reigned till he died by an assassin's hand in 548. The Visigothic state now became what it had been prior to 419, a purely elective monarchy, and the choice of the kings was frequently attended by civil war. Athanagild, who was placed on the throne by a rebellion in which he was aided by an army from Justinian, reigned prosperously for fourteen years (554-567); but his Byzantine allies

(the 'Greeks,' as they were called) seized several of the Spanish cities, and were not completely dis-

of the Spanish cities, and were not con-lodged until about 625.

The brilliant reign of Leovigild, who made Tolcdo the capital of the kingdom, was marked by the subjugation of the Snevic kingdom in north-western Spain and Portugal. In 572 Leovigild associated with himself in the kingdom his two consecutions. Ermenegild and Receased. The former, a convert to Catholicism, rebelled against his father, but after two years was conquered, and afterwards put to death. It is said that he was offered his life and restoration to his royal dignity if he would return to the Arian faith. By the Catholic Church he was reverenced as a martyr, and was formally canonised by Pope Sixtus V.
On the death of Leavigild his son Receased,

already a erowned king, succeeded without the formality of election. One of his first acts was to announce his determination to adopt and to estab-lish the Catholic religion. The Goths, who were evidently weary of their position of erclesiastical isolation, and had lost interest in their hereditary ereed, accepted the change with surprising readi-Revolts took place in Gaul and in the former Snevie kingdom, but these were soon suppressed; and the Arian clergy and laity were in averwhelming numbers admitted into the Catholic

Church.

The conversion of the Visigoths was a political necessity. The scenre establishment of their dominion was impossible so long as they were divided from the subject people by religious differ-ences, and had against them the powerful organ-isation of the Spanish Church. This formidable isation of the Spanish Church. This formidable adversary was now converted into an ally; but unhappily the weakness of the monarchy enabled unhappily the weakness of the monarchy enabled the church to exact ruinously great concessions as the price of its support. In the course of the 7th century the Visigothie state became gradually more and more subservient to the church. The kings were elected by an assembly of hishaps and court officials, the former often heing in a large majority. The three sovereigns who succeeded for a time in vindicating their independence—Swinthila (620-631), Kindaswinth (641-649), and Wamba (672-680)—were eventually either denosed or induced to abdicate; and in the either deposed or induced to abdicate; and in the next reign the ground lost by the church was always piore than regained. It is hardly too much the say that under the more ecclesiastically-minded kings the country was governed mainly in the interests of the clerical order; and on the whole the influence of the priesthood was so exercised as to foster, instead of to check, the many causes of decay and disorganisation which brought about the ruin of the kingdom. The efforts of Witica (701-710) to carry out extensive reforms in church and state were indeed seconded by the Archbishop of Tolede, but were virulently opposed by the great body of the clergy. Of his successor, Roderic, 'the last of the Goths,' legend has a great deal to banks of the Guadalete (August 711) placed the banks of the Guadalete (August 711) placed the dominion of Spain in the hands of the Moorish invaders. Under the pressure of the Moslem yoke the Christians of the Peninsula became united into one nation, and the Goths ceased to exist as a separate people; but the Spanish nobility have always laid claim to Gothic descent.

The last portion of the Gothic race to disappear as a distinct community was that branch of the Ostrogoths (known in the 6th century as Tetrawitw) who inhabited the Crimea from the time of Ermanaric. In the reign of Justinian these Goths received a Catholic bishop from Constantinople, and in the official language of the Eastern Church 'Gothia' continued to be the name of the Crimea

down to the 18th century. In 1562 the famous traveller Bushecq met at Constantinople with two Crimean envoys, and wrote down a long list of words of their language, which he recognised as having an allinity with his native Flemish. The words are for the most part magnestionably Gothic. It is possible that in the Crimea the Gothic speech may have survived to a much later time; in 1750 the Jesnit Mandorf learned from a native of that region, whom he had ransomed from the Turkish galleys, that his countrymen spoke a language

having some resemblance to German.

The Gothic language is now classed by philologists as belonging, together with the Scandinavian dislect, to the 'East Germanic' group, so called in contradistinction to the 'West Germanic,' which includes Old English and Low and High German, lu some of its features the East Gerthan the other branch—e.g. in the preservation of the inflexional final -z (becoming in Gothie s and in ()ld Norse r), which in West Germanic is last. On the other hand, there are certain features (such as the substitution of *-aggre-*, *-iggre-*, for the original *-auw-*, *-cuw-*) in which the eastern branch shows a later stage of development. As the Bible translated by Wulfila is several centuries older than the earliest written remains of any other Tentonic language, the value of Gothic in the study of Tentonic philology is very great, although the mistaken notion that it represents substantially the ancestral form of the Tentonic languages as a whole led the scholars of an earlier generation into many errors which are still aften repeated in popular handbooks. The Gothic written character, believed to be the invention of Wulfila, is substantially an adoption of the ordinary (Greek alphabet of the 4th century, some letters, however, being taken from the Latin, and others from the Rume alphabet used by the Guths before their conversion. appliance used by the crums before their conversion. The most scientific grammar of the language is that of W. Branne (Eng. trans. 1883); Douse's Introduction to the Gothic of Ulphilas (1886) is also valuable. The most complete dictionary is also valuable. The most complete dictionary is still that of Schulze (Magdeburg, 1848), which gives full references to the passages in which the words occur, and also the Greek words which they render in Wulfila's translation. It should, however, be checked by comparison with later works—e.g. with Schulze's ahridgment of 1867, or the concise dictionaries of Heyne and Bernhardt. A useful vocabulary, with an online of the granmar, has been published by Professor Skeat (1868).

The scanty written remains of the Gothic language are searcely cultitled to the name of literature. Wulfila's translation of the Bible, however, is a work of extraordinary ability, and from its early date and its extreme faithfulness is of some value for the textual criticism of the New Testament. The extant portions comprise the greater part of the four gospels, parts of St Paul's epistles, and some verses of Exra and Nohemial. The remaining Gothic writings are a portion of a commentary on the gospel of St John, two title-deeds referring to property at Ravenna and at Arezzo, and a fragment of a Gothic calendar. All the existing Gothic MSS, seem to have been written in Italy in the first half of the 6th century. The most important of these, the beautiful Codex Argentous of the gospels, was discovered in the 16th century in the momentary of Werden in Westphalia, and is now at Upsala. Of Gothic inscriptions in the Ranic character only three are known, all probably belonging to the 4th century; two of them are merely men's names (Tilarids, Ranya) scratched on spear-heads, and the third consists of the words Gutani ôwi (or 6kwi) hailag,

'the holy . . . of the Goths,' on a gold necklet found in 1838 at Petrossa in Wallachna. See Henry Bradley, The Goths, to the end of the Dominion in Spain ('Story of the Natious' series, 1888).

Götterdämmerung. Sec Ragnarok.

Gottfried von Strasburg, a famous medieval German poet, who flourished about the close of the 12th and the beginning of the 13th eentury, contemporary with Hartmann von Aue, whom he celebrates as the first of German narrators, Wolfran von Eschenbach, to the prologne of whose Pozziral he atlades, and Walter von der Yogelweide. Gottfried's poem, Tristan and Isolde, extends to 19,552 short rhymed lines, but was left unfinished, and ends abruptly. It was completed about 1210, and he hinaselt died between that year and 1220. The story itself is of course of Celtre origin; and there is hardly another theme that has had such a potent spell upon the imagination of poets in every age. Gotthied's immediate source was a poem of the French tronvère Thomas, of which only fragments now exist; but in his hands the theme has been treated with a new poetie vigour and mastery at once of pathos and of passion. Gottfried's works, with later continuations of Tristan by Ultich von Türheim and Heinich von Freiberg, were published by Fr. Heinrich von der Hagen (1823). The best edition is that of Bechstein (2d ed. 1873). Modern German translations have been given by Kurtz (1844), Sünrock (1855), and Wilh. Hertz (1877). Wagner has made use of Tristan for his opera Tristan und Isolde, See Franck's Tristan en Isoudt (1865), and Golther's Die Sage von Tristan und Isolde (1887).

Göttingen (10th century Gulingi), a town in the former kingdom of Hanover, lies 538 feet above sea-level in the Leine's wide valley, encircled by gentle hills—the highest, the Hainberg (1246 feet). By rail it is 67 miles S. of Hanover, and 36 NE. of Cassel. The ramparts, long since outgrown, and now planted with lindens, form a charming promenade; but architecturally Gottingen has nothing much to boast of—a quaint rathhaus, a statue of William IV., and a few antique buildings, one of which, the dacobikirche, has a steeple 320 feet high. The celebrated university (Georgia Augusta) was founded 1734 37 by Baron Minchhausen, under the anspices of George 1L, Elector of Hanover and king of England, and now has 120 professors of various grades, and more than 1000 students of philosophy, theology, medicine, and jurisprudence. Connected with it are the library of 500,000 volumes connected with there the fibrary of 500,000 volumes and 5000 MSS., the art museum, the splendid botanic garden (laid out by Haller), the observatory, the laboratory, the lying in hospital, &c., as also the Royal Society (1750) which publishes the well-known Transactions and the Gattinger Gelebrite Anxeigen. Longfellow, Motley, Ticknor, Bancroft, and several other illustrious Americans studied at Göttingen, whose native alumni inclined many of Germany's most famous sons. The 'Göttinger Dichterbund' was a small poet band (Voss, the two Stolbergs, Klopstock, Bürger, &c.) who, in the 'Storm and Stress' days of 1770-78 did much for the revival of national feeling; by the 'Gottinger Sieben' are meant the seven professors (Albrecht, Dallmann, Ewald, Gervinns, the two Grimms, and Weber) who for their liberal tend-encies were in 1837 expelled by King Ernest Angustus. The book-trade is of more importance than the manufactures—woollens, sugar, chemicals, &c. Pop. (1875) 17,057; (1885) 21,598, of whom 1714 were Catholics, and 536 Jews. Raised to a town in 1210, and a considerable member of the Hanse in the 14th century, Göttingen suffered much during the Thirty Years' War, when it was taken by Tilly in 1626, and recaptured by the

Swedes in 1632. See works by Frensdorff (1878) and Hasseblatt (1881).

Gottschall, Rudolf von, German poet, born at Breslan, 30th September 1823, made his debut with a couple of volumes of very moderate political poems (1842-43). During the next ten years he produced several plays, of which the most successful was Pitt und For, and one of the best Lambertine ron Mericourt. In two epic poems, Die Gottin (1853) and Carlo Zeno (1854), he emancipated himself largely from the exaggerated rhetoric, mistiness, and fantastic style of his carlier pieces. About the same period he published Deatsche Nationalliteratur in der craten Hulfte des 19ten Jahrhanderts (2 vols. 5th ed. 1881) and Poetik (5th ed. 1883), in which he advocates the cause of 'modern ideas' in literature. Then, after writing other plays, the best being the tragedy Macappa (1859), he assumed in 1864 the editorship of two literary journals published at Leipzig. The results of his activity in this new line of work appeared in four volumes of essays, Portrats and Studien (1870-71). Since 1875 he has written a tolorably long series of romances. More than one selected collection of his voluminous writings has been printed.

Gottsched, Johann Christoph, an important ligure in the history of German literature, was born at Judithenkirch, near Königsberg, in Prussia, Pehmary 2, 1700. At the university of Königsberg be studied philosophy, belles lettres, and languages. In 1724 he removed to Leipzig, where ninginges. In 1724 he femore it of Leipzig, where in 1730 he became professor of Philosophy and Poetry, and in 1734 professor of Logic and Metaphysics. He died 12th December 1766. Between 1729 and 1740 Gottsched exercised a sort of Johnsonian dictatorship in the world of polite literature in Germany. At lirst he hald down, in various periodicals which he edited, rules and theories for the composition of poetry, and sharply criticised the bombastic absurdities of the Silesian school of poets. At the same time he laboured, to the best of his abilities, to improve his mother-tongne as a literary vehicle, by aiming at greater polish, formal completeness, and elegance. But his chief endeavours were directed to the reformation of the German drama, a work in which, in co-operation with the Nenbers, he did indeed effect a very meritorious alteration, in that he raised the moral tone, the literary workmanship, and the taste of the acting plays, banished the coarse buffooneries of Hanswirst ('Jack Pudding') from the boards, and recommended as models the best class of French theatrical pieces. But his reforming zeal carried him too far, and brought him on to the dangerous ground of excess. He became pedantic and vain; his critical faculty became distorted; he manifested a petty jealousy of all literary anthority save his own, apposing himself to the Swiss writers Bodmer and Breitinger, and refusing to see any merit in Klopstock and Lessing. His own model drama, The Dying Cate (1732), notwithstanding its immense success, is sadly barren of poetry and dramatic action. He did, however, leave one useful work, Nothiger Vorrath zur Geschichte der Deutschen drumatischen Diehtkunst (1757-65), an unfinished catalogne of plays from 1450 to 1760. See Danzel, Gottsched und seine Zeit (1848); and Bernays, Goethe und Gottsched, zwei Biographien (1880).

Götz von Berlichingen, 'of the Iron Hand,' a German knight of the 16th century, was born at Jaxthausen, in Würtemberg, in 1480. (Götz is an abbreviation of Gottfried.) His education was conducted by his uncle Conrad, with whom he attended the diet of Worms in 1495. From 1497 onwards to 1525 his restless spirit, and the general turbulence of the time, involved him in continual fends, in

which he displayed a mixture of lawless daring and chivalrons magnaninity. At the siege of Lands-hut (1505) be lost bis right hand, which was replaced by an artificial one of steel, cunningly invented by himself; it is still shown at Jagstfeld. Twice he was declared under the ban of the empire for acts which were little better than acts of brigandage or highway robbery-in 1512 for plunderandage of highway robbery—in 1512 for plundering a band of Nuremberg merchants, and in 1516 for carrying off Count Philip of Waldeck and extorting a large ranson for his liberation. Having joined Duke Ulrich of Wurtemberg when this prince was attacked (1519) by the Swabian league, Gotz, after making an heroic defence of Möckminhl, was, contrary to the articles of his capitulation, taken prisoner, and only released at the intercession of his friends, George von Frundsberg and Franz von Siekingen, on payment of 2000 florins ransom. In the Peasants' War of 1525 be took part with the insurgents and was chosen leader of a part of their forces. This step he ascribes to compulsion; more likely it was the result of his own restless and turlimbert spirit, and of a desire for revenge on his old encinies of the Swabian league. Although acquitted of blame for his participation in this affair by the supreme court of the empire, he was nevertheless captured by his enemies of the Swabian league, kept a prisoner at Augsburg for a couple of years, and at last sentenced to perpetual imprisonment in his own castle, and, in case of his breaking this condition, to a fine of 20,000 florins. He was only freed from this irksome bondage on the dissoluonly freed from this irksome bondage on the dissolution of the league in 1540. Two years later he was again in action, lighting with the emperor in Hungary against the Turks, and two years later still in France. He died July 23, 1502, in his castle at Hornberg on the Neckar. He wrote an account of his own life, published by Pistorius (Nurn. 1731; Brest. 1813), which furnishes an oxcellent picture of the social life and manners of the period, and on which the died by computed his drawn of the treatments. which Goethe grounded bis drama of Gootz von Berlichingen, translated by Sir Walter Scott.

Gonda (Dutch Ter Gouwe), a town of South Holland, on the right bank of the Hollandsche Yssel, 13 miles by rail NE, of Rotterdam. The church of St John has seventy-live magnificent stained-glass windows, which were executed between 1560 and 1603 by the brothers Crabeth. The organ, too, has a fine row humana stop. Gouda was formerly fumous for its clay-pipes, and is now notable on account of its brickworks and stearing candle factory. It has a large trade in butter and Gonda cheese. Pop. (1874) 16,369; (1888) 19,535.

Gough, Hugh Gough, Viscount, conqueror of the Sikhs, was born at Woodstown in County Limerick, freland, 3d November 1779. He served at the Cape, in the West Indies, and through the Peninsular war, especially distinguishing himself at Talavera and Vittoria. In 1837 he went to India as major-general, and in the following year was made commander-in-chief of the forces sent against China. After storming Canton and forcing the pussage of the Yang-tsze-Kiang, be compelled the Chinese to sign the treaty of Nanking (1842). In 1843 he defeated the Mahrattas at Maharajpur, and brought about the peace of Gwalior. On the enemy in the brilliant battles of Mudki, Firozshali, and Sohraon, for which he was given a peerage. In 1848 the Sikhs renewed the war, but were again defeated by Gough at Ranmagar, Chillianwalla, and Gujerat, victories which resulted in the annexation of the Punjab to British India. Gough was in 1849 created a viscount, and about the same time returned to England. He was made field-marshal in 1862, and died near Dublin, 2d March 1869.

Gough, John Bartholomew, temperance lecturer, was born at Sandgate, Kent, Angust 22, 1817; his father was a pensioner of the Peninsular war, his mother a village schoolmistress. At the age of twelve he was sent to America, and worked on a farm in Oneida county, New York. In 1831 he went to New York city, where he found employment in the binding department of the Methodist book establishment; but habits of dissipation lost him this employment, and reduced him to that of giving recitations and singing comic songs at low grog-shops. He was married in 1839; but his drunken habits reduced him to poverty and delining tremens, and probably caused the death of his wife and child. In 1842 a henevolent Quaker induced him to attend a temperance meeting and take the pledge; and soon afterwards, resolving to devote the remainder of his life to the cause of temperance, Gough attended temperance meetings and related his experience with such effect as to influence many others. A few mouths later he had a short telapse into drunkenness; but an eloquent confession restored him to favon, and he lectured with great pathos, humour, and earnestness in various parts of America. In 1853 he was engaged by the London Temperance League, and lectured for two years in the United Kingdom, where he attracted large crowds to his meetings. He was again in England in 1857-60 and 1878. In some of his later addresses he took up literary and social topics, and acquired a moderate fortune by his lectures. He died at Frankford, Ponnsylvania, February 18, 1880. He published an Autobiography (1846); Prantenace Lectures (1879); and Smilight and Shadow, or (Remings from my Lifevorl (1880).

Gough, Richard, English antiquary, was born in London, 21st October 1735. On leaving Benet (now Corpus Cluisti) College, Cambridge, in 1756, he began work as a professed antiquarian by a visit to Peterborough and Crowland, and continued to make similar excursions down to 1771. Two years later he commenced the preparation of an English version of Camden's Britannia, which was issued in 1789. But three years previously he had published his important Sepulchrat Monuments of Great Britain, which was brought down only to the cud of the 15th century. Autongst numerous minor works from Gongh's pen was a History of the Society of Antiquaries of London (1770). He died at Enfield, in Middlesex, 20th February 1809.

Goujon, Jean, the most skilful sculptor of France during the 16th century. The date and place of his birth are not known. The finest productious of his chisel are a figure of 'Diana reclining by a Stag,' now in the Louvre, a remarkably vigorous and graceful work; the reliefs for ounamenting the Fountain of the Innocents, also in the Louvre; the sepulchral monument to the Duke of Brèze, in Rouen Cathedral—if it is by him—executed some time between 1540 and 1552; and several reliefs in the Louvre, where Genjon worked from 1555 to 1502, especially four Caryatides. He was a Huguenot, but seems to have died before the Bartholonew massacre in 1572.

Goulburn, a town of New South Wales, 134 miles SW. of Sydney by rail, with several tanteries, boot and shoe factories, llour-mills, and breweries, and a busy trade in agricultural produce. It is a substantially built town, with gas (1879) and a good supply of water. The seat of an Anglican and of a Roman Catholic bishop, it contains a handsome Church of England cathedral (Gothic, consecrated in 1884) and a Roman Catholic cathedral. It has also a Catholic college and a convent. Pop. about 9000.

Goulburn, Edward Meabrick, D.D., son o Edward Goulburn, serjeant-at-law, was born 1818. He was educated at Eton and Balliol College, Oxford, where he graduated in 1830, and in 1841 was elected a Fellow of Merton. After holding the Oxford incumbency of Holywell, he became headmaster of Rugby (1850-58), in succession to Dr Tait. He next became prebendary of St Paul's (1858); chaplain to the Queen, and vicar of St John's, Paddington (1859); and Dean of Norwich (1866), which office he resigned in 1889. In 1872 he led the opposition to Dean Stanley's proposal to make subscription to the Athanasian Creed permissive in the case of ordination. Among his publications are The Philosophy of Grammar, with especial reference to the Doctrine of the Cases (1852); Thoughts on Personal Religion (1862); and The Office of the Holy Communion (1863).

Gould, Benjamin Apthone, astronome, was born in Boston, Massachusetts, 27th September 1824, graduated at Harvard in 1844, and received the degree of Ph.D. at Gottingen in 1848. Returning to America, he conducted the Astronomical Journal from 1849 to 1861, was director of the Dudley Observatory at Albany in 1856-59, and in 1866 was the first to determine by aid of the submarine cable the difference in longitude between Europe and America. Appointed in 1868 to direct the national observatory at Cordoba in the Argentine Republic, he organised an adminable series of stations throughout the country, and mapped a large part of the southern heavens: his Uranometry of the Southern Heavens has done for the southern hemisphere what Argelander's Atlas did for the northern. In 1885 he returned to the United States, where he received the degree of LL.D. from Harvard in 1885, and from Columbia in 1887. Dr Gould has published valuable astronomical reports and charts, and is a member of numerous scientific societies in Europe.

Gould, Jay, American financier, was born, the son of a farmer, at Roxbury, New York, 27th May 1836. He made a survey of parts of the state, engaged for a short period in lumbering, and accumulated enough capital to become in 1857 the principal shareholder in the bank of Strondsburg, Pennsylvania. He now began to lury up railroad bonds, and in 1859 established himself as a broker in New York city. He was president of the Eric railway company till 1872, and afterwards invested largely in the stocks of other railways and telegraph companies. In 1882, a question of his commercial stability having arisen, he took the effective step of producing stock certificates having a face value of \$53,000,000, and offered to produce \$20,000,000 more; in 1887 it was estimated that he controlled over 13,000 miles of railway, or nearly a tenth of the entire mileage of the country.

Gould, John, ornithologist, born at Lyme, Dorsetshire, in 1804. Removing in early life to the neighbourhood of Windsor, where his father was foreman in the Royal Gardens, his ruling passion soon showed itself. He became curator to the Zoological Society's Museum in 1827, when the friendship of Mr N. A. Vigors encouraged him in the production of the first of the large illustrated folios the publication of which from time to time established his reputation. This was a Contury of Birds from the Himalaya Mountains (1832), the plates being drawn and coloured by his wife. Next after this followed Monograph of the Ramphastide (Toucans) (1834), Icones Avium (1837), Birds of Europe (1832–37), and Monograph of the Trogonida (1838). Assistance was now granted him to proceed to Australia in order to study its natural history; the results of his investigations appeared

in Birds of Australia (7 vols. 1840-48), Mammals of Australia (1845), and Family of Kangaroos (1841-42). His Monagraph of the Odontophorina (American Partridges) appeared in 1844-46, and his Humming Birds in 1849. He took immense pains with the illustrations to the latter, the humming-birds, of which he had a splendid collection on view at the Exhibition of 1851, being great favourites with him. Gonld's other great works, several of which were left unfinished, were Birds of Great Britain (1802), Birds of Asia, and Birds of New Guinea. Gould, who was a Fellow of the Zoological Society, helped to prepare the department 'Birds' in the Zoology of the Voyage of the Beagle, was a keen sportsman, an accurate observer, and a patient and successful labourer in his chosen field of study. He died February 3, 1881. See Westminster Review, 1841; and Nature, 1881.

Gounod, Charles François, an eminent French composer, was born in Pais, 17th June 1818, and studied at the Conservatoire under Halevy, Lesneur, and Paer. Obtaining the first prize in 1839, he was sent to Rome to complete his musical education, and while there devoted himself chiefly to religious music. On his return to Pair the ways for a line attached to the abundant to Paris he was for a time attached to the elunch of the Missions Etrangères, where his earliest compositions were performed; one of them, a Messe Solennelle, was the first work which brought him into general notice. For a time he contemplated taking orders, and went through part of the mathinism materials. plated taking orders, and went unrough part of the preliminary novitiate. His first opera, Sappho, was produced in 1851; in 1852 he wrote chouses for Ponsard's draing of Ulysso; and in 1854 appeared his opera of La Nonne Sangtante. His comic opera, Le Nédeciu mulgré lui (1858), was a great success; it was followed in 1859 by Faust, which at once the interpretation of the same productive and referred tite. attained European popularity, and raised its composer to the foremost rank of contemporary musicians. *Philomonet Baucis* followed in 1860; in nunsielans. Pritomon et Bauers followed in 1809; in 1802, La Reine de Saba (brought out afterwards in England as Irene); in 1864, Mireille; in 1867, Roméo et Juliette; in 1878, Polyeude; in 1891, Le Tribut de Zamora. He has also published much church music, including several masses, hymns, and motets or anthems, and is extensively popular as a song-writer. His oratorio, The Redemption, produced at the Birmingham Festival in 1882, and deemed by the composer his masterpiece, has achieved great popularity in Britain, though less esteemed abroad; its sequel, More et Vita, written for and produced at the succeeding Festival in 1885, has not gained equal approval. 1870 to 1875 he resided in England, where his works are as much admired as in his own country, his sacred music probably even more. He is a master in all branches of his art, but more especially of the orchestra, in which he is the originator of many new and impressive combinators of many new and impressive combinators. tions. His dramatic faculty, though great, is often dominated by the lyric element. In feeling he exhibits a singular alternation between, and even a combination of, the mystic and the voluntuouse.g. sensuous melodies with solemn religious harmonies; the humorous element is almost entirely absent. Faust is generally deemed his most enduring work. He is a member of the Institute (1866), and a Commander of the Legion of Honour (1877).

Goura, a genus of beautifully crested groundloving pigeons, including the largest and perhaps finest members of the family. They inhabit New Guinea and adjacent islands, where they are fond of walking in pheasant-like fashion along the forest paths. They nest on trees and feed on fruits. The first known species, G. coronatus, is a beautiful bird over two feet in total length, with the characteristic fan-like crest on the head. It is sometimes kept among ponltry, and its flesh is much esteemed.

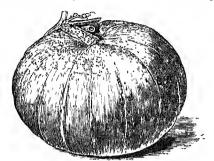
Gourd (Cueurbita), a genus of plants of the natural order Cneurbitacere, nearly allied to the cueumber, having male and female flowers on the same plant, the flowers large and yellow. The species are annual plants of very rapid growth, their leaves and stems often very long and trailing; they are natives of warm climates, although the native region of the kinds chiefly enltivated is very uncertain, and they have probably been greatly medified by long enltivation, so that perhaps all of them may be forms of one original species, a native of some of the warmer parts of Asia. The Common Gourd or Pumpkin, Citrouille of the French (C. pepo), with smooth globose or pear-shaped fruit, varying from the size of a large apple to 50 or 100 lb. in weight, is much enltivated hint in gardens and fields in almost all parts of the world of which the climate is warm enough for it; and the fruit is not only a very important article of luman food, but is also used along with the superabundant shoots for feeding cattle. In many countries pumpkins are a principal part of the ordinary food of the poorer classes, and are much used even by the wealthy; they are not eaten raw, but dressed in a great variety of ways—as in pies, with sugar, spice, &c., or sliced and fried with oil or butter, or made into sonps, &c. Pumpkins are much cultivated in North America. In England they are also cultivated, but not to a great extent, and never as food for cattle.—The Vegetable Marrow (C. onifera or C. succada) appears to be a mere variety of the pumpkin. It is now more generally enltivated in Britain than any other kind of gourd, being one of the most hardy, and its fruit of excellent quality and useful for enlinary purposes at almost every stage of its growth. When full grown the fruit is elliptie, very smooth, generally about 9 inches long and 4 inches in diameter; but there are many varieties distinguished by the form of the first and by the delicacy of the texture and flavour of the flesh.—One of the most valuable gourds for enlinary purposes



The Great Gourd (Cucurbita maxima):
Branch with flower,

of which the Spanish Gourd is a green-fruited variety; and the Great Yellow Gourd, the largest of all, has yellow fruit, with firm flesh of a deep yellow colonr. It is sometimes fully 200 lb. in weight and 8 feet in circumference. The form of the fruit is a somewhat flattened globe; when holled it is a very pleasant and wholesome article of food. It is much cultivated in the south of

Europe. The French call it Potiron, and use it largely in soups.—The Squash (C. melopepo) differs from all these in generally forming a bush, instead of sending out long trailing shoots; also in the extremely flattened fruit, the outline of which is generally inregular, and its whole form often so like some kinds of cap that in Germany one variety is commonly known as the Elector's Hat, and the name Turk's Cap is



Fluit of Cucurbita maxima.

bestowed on another. The Squash is regarded as one of the best goards, and is much cultivated in some parts of Europe and in North America.—The Wasted Gound (C. verrucosa), which has a very hard-skinned fruit covered with large warts, and the Musk Gourd (C. moschata), distinguished by its musky smell, are less hardy than the kinds already named; as is also the Orange found (C. auratia), sometimes cultivated on account of its beautiful orange-like fruit, which, however, although sometimes edible and wholesome, is not unfrequently very unfit for use, on account of colocynth developed in it. This is apt to be the case in some degree with other gourds also, but the bitter taste at once reveals the danger. The same remark is applicable to the young shoots and leaves, which, when perfectly free from bitterness, are an excellent substitute for spinach. In Scotland even the most hardy gourds are generally reared on a hotbed and planted out. In England it has been suggested that railway-banks might be made productive of a great quantity of human food by planting them with gourds. It pegoards may be kept for a long time in a cool well-ventilated place, nor are they injured by cutting off portions for use as required. The name gourd is often extended to many other Cuenrbitaces. See Cucumber, &e.; also Bottle-Cucumber.

Gourock, a watering place of Renfrewshire, on the Firth of Clyde, 3 miles WNW. of Greenock by a railway opened in 1889, since which time it has become the starting-point of Irish and other steamers. At Kenpoch Point here, behind which rises Barrhill (478 feet), stands 'Granny Kenpoch,' a prehistoric monolith associated with the witches of Renfrewshire (1602). In 1688 the first red herring ever cured in Great Britain was enred at Gourock. Pop. (1841) 2169; (1881) 3336. See D. Maerac's Notes about Gourock (1880).

Gout (Fr. goutte, from Lat. gutta, 'a drop'), a medieval term of uncertain date, derived from the humoral pathology (see RHEUMATISM), indicating a well-known form of disease, which occurs for the most part in persons of more or less luxurions habits, and past the middle period of life. In its most common and casily recognised form, it manifests itself by an acute inflammation in the neighbourhood of one of the joints, usually the ball of the great toe; and to such attacks only the name was once applied. But its use is now extended by

most writers to include all injurious effects in any part of the body produced by the same condition of the system which leads to the inflammation of the joints. The name podagra (Gr. pod., 'foot,' and agra, 'seizure') indicates the leading character of the disease as apprehended by all antiquity; and the very numerous references to the disorder so called, not only in the medical writings of Hippocrates, Galen, Arctens, Calins, Anrelianns, and the later Greek physicians, but in such purely literary works as those of Lucian, Seneca, Ovid, and Pliny, show not only the frequency, but the notoriety of the disease. The allusions, indeed, are of a kind which give ample proof that the casential characters of gont have not been changed in the lapse of centuries. It is caricatured by Lucian in his burlesque of Tragopadagra in language quite applicable to the disease as now observed; while the connection of it with the advance of luxury in Rome is recognised by Seneca (Epist. 95) in the remark that in his day even the women had become gouty, thus setting at maught the anthority of physicians, which had asserted the little liability of women to gout. Pliny likewise (book xxvi, chap. 10) remarks upon the increase of gont, even within his own time, not to go back to that of his father and grandfather; he is of opinion, further, that the disease must have been imported, for if it had been native in Italy it would surely have had a Latin mame. Ovid and Lucian represent gont as mostly inemable by medicine; from this view of it Pliny dissents. The list of quack remedies given by Lucian is one of the most curious relies of antiquity.

General Causes of Gout.—In more than half the

cases gout can be traced to inheritance. There is in fact no disease in which hereditary trunsmission is more clearly established; in some families its recurrence is notorious. Professor Cuntani of Naples even states that in his country 'the hereditary tendency has been handed down from the period of the Greek colonisation and the Roman empire.' Yet even in those strongly predisposed to it its actual occurrence may be avoided by strict regulation of the diet and habits. For, if it is certain that it may be inherited, it is no less certain that it may be acquired, though perhaps not, at all events not readily, by every one; and that the most important of the causes which lead to it are errors in diet. Of these popular opinion has seized upon excessive consumption of alcohol alone; and there is no doubt that alcohol, especially in the form of strong wine or heer, has a nowerful effect. But complete abstancace from alcohol will not protect those predisposed to it from the development of gout, unless they are careful with regard to food as well; overeating, especially excessive indulgence in animal food and in rich and highly-seasoned dishes, is no less certain to be prejudicial. Too little exercise, especially when associated with too much food or drink, is also

Italy.

Essential Nature of Gout.—It has long been known that the tophi or chalkstones deposited under the skin in most well-marked and severe cases of gout consist largely of mate of soda; and that Uric Acid (q.v.) and its salts are often exerted in large amount in the mine of gouty persons. But it was first shown by Dr (now Sir) A. Garrod that this substance is always present in considerable quantity in the blood in cases of gout; in chronic gout at all times, and in acute gout for

hurtful. Chronic lead-poisoning is frequently asso-

ciated with the development of gout, though the reason of this is not yet understood. Gout is much more common in the male than in the female sex. It is said to be most common at the present day in England, especially in London, and in southern

GOUT 329

some time before the occurrence of an attack. It is now agreed by all that the presence of this substance in excess in the system is an important factor in the production of gont; but authorities differ as to how its presence is to be explained. There are two main theories on the subject which it must suffice to mention: (1) that the processes of disintegration going ou in the body, particularly in the liver, lead to its formation in excessive amount; (2) that there is not excessive formation, but defective elimination of it by the kidneys. There is, however, a third theory with regard to the origin of gont, which attributes its occurrence to a perverted condition of the nervous system, and regards the presence in excessive amount of urate of soda in the blood as a subordinate though still important feature of the disease.

Symptoms of Acute 'regular' Gout.—Sydenham's treatise on gout, written 200 years ago, is interesting not only as containing the well-considered views of a master in the medical art, but also as the faithful description of the disease by one of the victims of it. His account of the paroxysm of regular gout may be given here with some abbreviation. After some weeks of previous indigestion, attended with flatulent swelling and a feeling of weight, rising to a climax in spasms of the thighs, the patient goes to bed free from pain, and having had rather an innaturally strong appetite the day before. In the middle of the night he is awakened by a pain in the great toe, or sometimes in the heel, the ankle, or the calf of the leg. The pain re-sembles that of a dislocated bone, and is accompanied by a sense as if water not perfectly cold were poured over the affected limb; to this succeeds chilliness, with shivering, and a trace of feverishness, these last symptoms diminishing as the pain increases. From hour to hour, until the next evening, the patient suffers every variety of tortime in every separate joint of the affected limb; the pain being of a tearing, or crushing, or gnawing character, the tenderness such that even the weight of the bedelothes, or the shaking of the room from a person's walking about in it, is unbearable, next night is one of tossing and turning, the uneasy limb being constantly moved about to find a better position; till towards morning the victim feels sudden relief, and falls over into a sleep, from which he wakes refreshed, to find the limb swollen; stage having been succeeded by a more general form of swelling, often with itching between the toes, and a peeling-off of the cuticle. This individual attack may be repeated many times in the course of what is termed 'a lit of the gout,' which course of what is termed 'a lit of the gout,' which sometimes extends over a period of weeks, or even months, before the patient is completely relieved; or the attacks may occur in both limbs, or in several other parts of the body in succession, the real termination of the 'fit' being at last indicated by an apparently complete restoration of health, and even, in some cases, by a period of improved condition and capacity for exertion, as compared with the state of the putient before the attack.

Such are the principal features of the 'legular gout.' In this form it might almost be called a local disease; although the connection of the attacks with deranged digestion, or with a variety of other minor allments too complex to be described here, and the obvious relief obtained through the 'fit' from the symptoms of constitutional suffering, point to a cause of the disease operating over a larger range of functions than those included in the ordinary local manifestations at this period. Regular gout, accordingly, forms only part of a mosological picture, in which the so-called irregular, atonic, metastatic, or retrocedent forms have to be included before it can be said to be at all complete.

These, indeed, form almost all the darker shadows of the picture; for legalar gout, though a very painful disorder, can haddly be said to be dangerons to life, or even to the limb affected, at least until after many attacks.

It is the tendency, however, of gout to fall into irregular forms; and herein lies its danger. One source of local aggravation is, indeed, soon apparent, and it leads rapidly to other evils. The joints which have been repeatedly the seat of the regular paroxysm become, more or less permanently, crippled and distorted. A white, friable, chalk-like material is gradually deposited around the cartilages and ligaments, and sometanes in the cellular tissue and under the skin (tophi or chalk-stones). Sometimes this material is discharged externally by ulceration, and then usually with relief. At other times it accumulates into irregular masses, or 'nodosities,' which entirely destroy, or at least greatly impair, the movement of the limb. The patient is laid up more or less permanently in his arm-chair; and exercise, the great matural specific remedy of the gouty, is denied by

the very conditions of the diseased state itself.

Other Manifestations of Gout.—With regard to what should be included under the term irregular gout there is much difference of opinion. It is sometimes no doubt used as a refuge for ignorance, when no other cause can be discovored to explain symptoms of ill-health. It is certain, however, that regular gont often alternates with a morbid con-dition in some other part of the body, and that many diseases occurring in those whose family history or habits of life may be considered to prodispose to gont, whether they themselves have suffered from regular gout or not, are benefited by hygienic and medicinal measures similar to those which do good in undoubted cases of gout; and most physicians agree in speaking of such as forms of gout. The most important of these we shall here enumerate, in connection with the organs affected. Heart and blood-vessels—pulpitation, irregularity of heart action, angina pectoris, and atheroma with its consequence, phlebitis. Lungs—asthma, bronchitis. Nervous system—nenralgia, headache, epilepsy, mental disorder. Skineczuna. Digestive organs—inflammation of throat,
various forms of indigestion, cramp or inflammation of stomach, jamidice. Urinary organs—initability of bladder; stone, especially the uric acid form (see CALCULUS); diabetes; above all, chronic Bright's disease. It is impossible within the limits of such an article as the present to give any description of the various manifestations of the gonty tendency; the above list of allments (most of them treated separately) will give some idea of their complexity and importance.

Treatment of Gout.—The cure of gont, in the highest sense of the word, demands the careful consideration of all its predisposing causes in the individual, and the strict regulation of the whole life and habits accordingly, from the earliest possible period. It is the difficulty of accomplishing this which makes gont a disease proverbially intractable; for the regular attacks of the disease seldom occur till pretty late in life, long after the habits have been fully formed which are most adverse to the enre. Rigid temperance in eating and drinking, with daily exercise proportionate to the strength and condition of the individual, in reality constitutes the only radical cure of the gont, the lesson of ages of experience as read to the gouty by the light of science. But the lesson is not learned, or only learned when too late. It should never be forgotten that a man of gouty family, or individually much exposed to the causes of the disease, can only hope to escape it in his old age by habits of life formed at an early period, and by a

careful avoidance of most of the common dissipa-tions of youth. That the disease may be warded off in this way there is ample evidence; and it is not less certain that there is no other way of living secure from gout. The treatment of the fit, in so far as it does not resolve itself into the celebrated prescription of 'patience and flannel, must be a subject of medical prescription. Blisters, leeches, and especially cold applications, though they may give temporary relief, are studiously to be avoided; the last sometimes even lead to a fatal result. The well-known virtues of ('olchiemn (q.v.) are perhaps somewhat overruted by the public; and its dangers are not less striking than its virtues. It is certain, however, that in cautious medical hands colchienm is a remedy of great value in the gouty puroxysm; and of equal value perhaps are certain natural mineral waters, as those of Vichy and Carlsbal. Alkalies and their salts, especially potash and lithia waters, as prepared artificially, with minute doses of iodine and bromine, have likewise been much recommended for the cure of gouty deposits. For the distinctions of gont and rheumatism, and the presumed relation between them in some cases, see RHEUMATISM. See Sir Dyee Duckworth's Treatise on Gout (1889).

Gontweed. See BISHOPWEED.

Govan, a police-burgh (since 1861) of Lanark and Renfiew shires, on the south bank of the Clyde, ontside the municipal boundaries of Glasgow, and about 3 miles west of its centre, but connected with the city by continuous rows of buildings. Its leading industry is shipbuilding. Govan Pack, 40 acres in extent, was gifted in 1885 by Mrs Elder, at a cost of £50,000. Pop. (1836) 2122; (1871) 19,200; (1881) 50,492.

Government. The term 'government' signifies the administration of the public allairs of a community; in a secondary sense it denotes the persons to whom that administration is committed, or a select number of such persons in whom the mincipal powers of management are vested. The domain of government extends in theory over the whole legislative and administrative business of the country at home and abroad; but some depart. ments of our domestic affairs, such as the administration of justice and the business of the perma-nent civil service, are not treated in practice as nutters of government. According to the various uses of the term, we speak of our constitutional government or our system of government by party, or the policy of a particular government, and we draw a distinction, when necessary, between the principal and the subordinate members of the government of the day. There is a distinction in kind between the administration of public affairs and the management of any private concern; but we speak metaphorically of the domestic government of a household; or, with a nearer approach to correctness, of the self-government of municipali-ties and other civil districts in regard to their local There may also be small and imperfectly affairs. developed communities, whether carried on under a patriarchal inle or under the form of a villagecommunity, or in some other radimentary form of society, to which it would be difficult to apply the terms of the art or practice of government with anything like exactness. In the case of an ordinary independent state the sphere of government in-cludes the administration of public affairs at home and the intercourse of the community with foreign nations. These functions may be separated and modified, as when a state forms part of a federal union or confederation or combination of states, in which the component communities have divested themselves of some portions of their sovereign power in favour of a central or combined authority,

to which certain kinds of public affairs have been delegated. The same remarks apply to dependent and semi-independent states, including such as have been brought under an empire, or have been mediatised, or neutralised, or in any other way have come under the protection or management of a superior power or combination of powers. In colonies the local authorities may be entitled to exercise the rights of government almost as freely as in the case of a protected state, subject only to the reserved rights of the mother-country and the supreme dominion of the home-government, if the necessity for its exercise should occur. There is indeed hardly any limit to the modes in which the relations between superior and subordinate communities may be constituted in matters of government, subject to the observation that the rights conferred on the inferior power may be so great that they practically amount to independence, or may be so closely bound that they give hardly more than the benefits of municipal self-govern-

ment.

The origin of government may be found in the social instincts of markind. As soon as a community attains to great unmbers, or a large extent of territory, some form of regular authority will be required and will necessarily be established. Plate is accessed of having seen no difference in kind between a large household and a small state. Anistotle, or the Aristotelian anthor of the Politics, conceived the state as being 'prior to the individual,' in the sense that it is the true object of the social instinct implanted in all men, and only requiring the legislator's wisdom to bring it to perfection. Every community is established with a view to some good end, and the state (which embraces all other communities) must have been established with the object of attaining the highest good. This theory is nearly identical with the modern opinions, in which a distinction has been made without much real difference, that the state was founded with the object of obtaining the greatest happiness of the greatest number, and that governments are intended to fulfil the higher aspirations of humanity. Many other theories of government have been advanced according to the Varying eircumstances of different times. It was found convenient in one age to secure a respect for authority by an appeal to the divine right of kings; at another time thinkers have been content to find the principles of government in following the momentary wish of the majority. Hobbes solved the difficulty by a new and arbitrary degnate. Mankind, according to his view, seeking refuge from the dangers of a state of nature, were led, not by any social instinct, but by motives of fear and prudence, to enter into a solomn compact by which they finally renounced the freedom which belonged to the individual man. The compact having once been made, the state becomes the 'Leviathan,' or all-pawerful being, to whom absolute and unchanging abedionee is due. Locke and many later writers took up the idea of a social contract as a convenient image for describing the combined action of mankind, but guarded their position by declaring that the compact might at any time be altered or reversed.

We may leave these barren speculations as to the origin of government with the remark that, according to the more modern opinion, such questions can only be solved, if at all, by the methods of comparative history. It is of more importance to inquire as to what are the essential sonse of the term. In the consideration of this part of the subject the mere forms of government may be disregarded. The correct answer to the problem seems to be that government, in

relation to the subject-matter with which it is concerned, is in the long-run, and continually tends to be, the expression of the will of the dominant power in the state. The expression may be diffienlt, owing to the complexity of the constitution or the number of constituent parts among which the power is distributed, or owing, as often happens, to the existence of artificial restrictions designed to afford opportunities for delay. Again, the will of the real rulers may be in a state of acquiescence, and the arriving at any decision in favour of change may be impeded in many ways, as by the influence of custom and tradition, the reluctance felt about disturbing an existing delegation of power, or the feeling that responsible and removable governors can safely be trusted. After making all deductions it seems clear that government is in fact an expression of the wishes of those who have the ultimate dominion, and that in free communities its course and even its form are determined by the general will of the people. The forms of government are, however, in some degree determined by accidental circumstances, such as the survival of institutions which have become obsolete, or which have been adapted to existing needs though their original object has come to an end. The possible variations in the form of government are almost countless, but it is still convenient to adopt to some extent the ancient methods of classification, according as the rule of the state is given to the one, the few, or the many. Another method of division is based on the distinction between those states in which the governote and governed have apparently been opposed to each other, and those in which the contest between prerogative and papular liberty has ended in national self-government.
Plate and Aristotle distinguished governments

as true or pure when power is given and used for the good of the subject, and as false or per-verted when it is maintained for the private interest of the ruler. Among such true forms they counted monarchy or royalty, in which one ruled for the good of all, and aristocracy or the rule of a class, equally acting in the common interest; besides these rare and ideal forms they found another pure form in the mixed or constitutional government, which was the favourite 'polity' of the Greek states when placed under favourable circum-tances. It must be remembered, however, that their arguments are made difficult of applica-tion to modern times by the facts that the states were very small, and that the great bulk of the population was enslaved; the last circumstance gave a dispropartionate importance to the military class, on which the existence of society depended, so that the ancient 'polities' were in practice dominated by an armed middle class, taken collections are presented in the control of the contro tively as representing the whole people. Hence it was expressly hid down in the Aristotelian Politics (lib. ii. chap. 7), that 'in a constitutional government the fighting-men have the supreme power, and the armed men are the citizens.' In the same place will be found an account of the perversions of true government. 'Tyranny,' or despotism, is a monarchy having in view the interest of the master of the state. Oligarchy, of which there are many varieties, exists when a small class, generally consisting of the rich, has the whole government in its power. In Aristotle's view the rule of a wealthy cluss was of the essence of an oligarely. Democracy, or the rule of the many, was on the same principle identified with government in the interests of the needy. The author of the Politics does not seem to have believed that a wealthy community could be a democracy, or to have conceived the idoa of representative government or of a democracy in the modern sense of the term. The democracy

described by him was obviously of an unstable and temporary character, ready to suffer a further pervension towards ochlocracy or a mere mob-government, ending in anarchy and the eventual interposition of a despotic or military form of government. Aristatle distinguished five kinds of monarchy

Aristatle distinguished five kinds of monarchy among the true or legitimate systems. The first was the Spartan form, or that which existed in Crete, the power of the kings in each case being strictly limited by the constitution. Next came the despotic form of monarchy, such as was found in the Asian empires, differing only from tyranny because the batbanians, as slaves by nature, were perfectly willing to obey. The third was the Dictatonship, which in Creece was not hereditary, but which has always tended in modern times to become so. Another kind might be called times to become so. Another kind might be called the Heroic form, the kings in ancient times having been 'priests, and judges, and warriors, and having a supreme authority in all things.' Last in the list was the absolute kingship, 'exercising an universal power, like that of the state over the public property, or that of the master over a household' (Arist, Pol. iii. chap. 15; Jowett's Introd. lxv.). The last-described monarchy is certainly a separate form of government, but it was obviously liable to pass of government, but it was onviously harbe to pass at any moment into a tyranny, nuless a succes-sion of disinterested 'benevolent despots' could be found. It should be observed that Aristotle did not think that any monarchy ought to be hereditary, and that he considered absolute monarchy to be contrary to the law of nature. His summary of the causes which had induced the transition from the old kingship to the modern republic is full of interest and information. The reason, he says, why ancient governments were monarchies is that in early times there were only a few good men who could confer benefits, and so they were made into kings. The reason, he adds, why democracies are now necessary is that all men are 'pretty much on an equality;' he is referring, of course, to the free-pien who had the franchise and a capacity for office. When good men increased in number, toyalties passed into aristocracies. These degenerated into oligarchies. Oligarchy passed into "tyranny," and tyrannies became democracies, for the rich became fewer and fewer, and the poor more and more numerous; and democracy seems to be the only faun of government any longer possible, now that cities are increased in size. He shows, however, this personal preference for the mixed constitution or 'pulity,' as probably the best form of government after the ideal 'rule of the best,' or 'aristocracy' in the highest sense of the term. The stages through which oligarchy usually passed are summed up as follows: at first there is a high qualification for office, and then as vacancies in office occur, a scheme of co-optation is devised: afterwards hereditary succession is introduced, and finally a few powerful families set up an absolute and arbitrary rule. Democracy in the same way has several stages from that in which all men are equal in circumstances and power, if such an 'Utopian parity' were possible, to the stages when a small qualification is imposed, when every one takes a share in the government, and lastly, when law ceases and the government is carried on by the decrees of the transient majority.

Plato constructed an ideal state, an aristocracy in which philosophers were kings, and thought that of inferior governments there were only four worthy of notice, though, doubtless, there were many intermediate forms both among Greeks and barbarians. He calls the first Timeeracy, being a constitution of the fashionable Spartan type, in which the powers of the kings and classes of citizens were limited by strict discipline, and the government was conducted on 'principles of honour,'

which in practice came to something like military government. It should be observed that the word 'timocracy' is also used to denote the system of distributing honours and offices according to wealth, a state of things to which the title of a plutocracy would perhaps be more appropriate. Next in Plato's list came Oligarchy, with its attendant evils of avarice and corruption; then Democracy, described as 'a pleasing lawless and various kind of government;' and lastly, Despotism, the 'disease and death of government.' Polybins (book vi. extr. 3, chap. 1) mentions the states of Lacedamon, Mantinea, Crete, and Carthage as those which were praised by all writers of antiquity. He differs from Plato as to the fact of resemblance between the governments of Crete and Sparta, not perceiving that they were alike in their balance of power, though their laws and institutions were different. The laws of Lycurgus appeared to him to be rather the 'work of some divinity' than the effort of a human mind. The government of Carthage was praised as being limited in much the same way, the king, senate, and people all having a share of nower; but his highest commendation was reserved for the Roman Republic. Of this he has left an interesting account, of which Cicero afterwards made considerable use in his treatiso De Republica.

Passing to modern times, we find that the existing kinds of government are still in many cases much influenced by traditions of the empire, and to some extent by the usages of fondalism. The autocratic form of government still survives, though the ruler's apparently absolute power is generally limited by a 'bureaucracy.' In the greater part of Europe we find constitutional monarchies, in which the powers of the crown and the various classes in the community are supposed to be balanced against each other. The tendency of most of these limited monarchies is apparently towards democracy. The democratic republic has been most successful in the United States of America and in the oldestablished Swiss Confederation. We have also seen the establishment of empires of a medieval type, as well as governments founded on a quinciple called Casarism, in which a democracy is supposed to have delegated its powers to a dicta-Various circumstances have led to the formation of dual and complex monarchies, and to the placing of various communities in dependent and subordinate positions. The most important feature in modern governments is the extension of the representative system, which can be best studied in the history of Great Britain, justly praised as the 'Mother of Parliaments.' Mr Mill's work on Representative Government should be consulted on the question whether our modern societies ought to make provision for protecting the minority. problems of government are continually changing, and new remedies will be required as fresh difficulties arise, but the main object of all governments, under whatever forms they exist, must be the fulfilment of the laws and the preservation of order and liberty.

What is the best form of government is a question which every one will answer according to his own disposition, if a specific answer can be given without reference to the varying circumstances of states and communities. Some aid in the matter may be obtained by the study not only of treatises dealing directly with the art of government, but also of political satires and the numerons writings upon the ideal state and the first principles of society. Among these may be mentioned the Utopia of Sir Thomas More, the De Monarchia of Dante, the sketch of a new government in Burton's Anatomy of Melancholy, Harrington's Oceana, and Lord Bacon's New Atlantis, besides Dr Jowett's Introductions to the Republic and Politics, and the

other treatises upon the subject which have already been mentioned.

Autong the multitude of modern writings which deal with the abstract principles of government particular notice is due to Sir G. C. Lewis's treatises on the Best Forms of Government and the Methods of Observation and Reasoning in Politics; Mr Herbert Spencer's works on Social Statics and the Principles of Sociology; Humboldt on the Sphere and Duties of Government; and Guizot's Histoire des Origines du Gouernement Représentative en Europe. Among the treatises which deal with the growth of governments by the methods of comparative history Sir H. S. Maine's work on Early Institutions is one of the most important. A general view of the rise of the governments of Europe at the found in Mr Hallam's View of the State of Europe during the Middle Ages, with which should be compared Guizot's Histoire técnénule de la Civilisation en Europe. With respect to the growth of the British constitution the reader should refer to the general essays and histories of Hume, Macanlay, and Freeman, and for more special information to the constitutional histories of England by Mr Hallam and Dr Stubbs, Earl Russell's English Government and Constitution, Earl Grey's Purliamentary Government, and Bagehot's essay on the English Constitution. On the important subject of political institutions in America the fullest information may be found in Storer's Commentary on the Constitution of the United States, and in the valuable work of Professor Eryce on the American Commonwealth. See the articles Amistocracy, Authornacy, Contains, &c.

Government Offices. See Civil Service.

GOVERNOY, the supreme executive magistrate of a state or colony. The varying functions of governors, governors general, and lientenant-governors are explained in the articles UNITED STATES, INDIA, &c. For the governor of a steam-engine, see STEAM-ENGINE.

Gow, Neil, a famous Scotch violin-player, was horn at inver, near Dunkeld, 22d March 1727, and before he reached manhood had become the best performer of reels and strathspeys in Perthshire. Through the notice of the Duke of Athole, with whom he was a life-long favourite, he was introduced to the patronage of the principal nobility and gentry throughout Scotland; and such was the kindly esteen in which he was held that Sir Henry Raeburn was several times employed to paint his portrait for his patrons. He died lst March 1807. Gow composed nearly a hundred tunes, mostly of a lively character; but it is chiefly to the tradition of his singular skill with the bow that his name owes its survival almost as a household word in Scotland.—His youngest son, NATHANIEL, horn 28th May 1766, was trained as a violin-player in Edinburgh, where in 1782 he became one of the king's trumpeters for Scotland, and subsequently was leader of a fashionable band, and successful teacher. His first venture as a musicseller (1796–1813) was not successful, and a second attempt ended in bankruptey in 1827; but his admirers came to his aid, and his few remaining years, though darkened by sickness, were not distressed by actual want. He died 17th January 1831. He published manerous and very full collections of Scotch airs and songs; and his own compositions intunber over two hundred—among them 'Caller Herring.'

Gower, part of Glamorganshire (q.v.).

Gower, John, English poot, was born probably about 1330, and seems to have belonged to a family that owned land both in Suffolk and in Kent. But little is known of his life save that he was rich and well educated, did not marry till late in life (probably in 1397), became blind about 1400, and died in the later half of 1408. His tomb is still to be seen in St Saviour's, Southwark. He was a personal friend of Chancer, who, in dedicating to

him his Troilus and Cressida, addresses him as the 'moral Gower'—an epithet that has indissolubly linked itself with his name. Near the conclusion inked itself with its name. Near the concinsion of the Confessio Amantis Gower makes Venns in some copies pay a warm compliment to Chancer as her 'disciple and poet,' which is followed immediately by lines expressing warm loyalty towards Richard II. Both these passages are omitted in the copy dedicated to Henry of Lancaster, then Earl of Derby (afterwards Henry IV.), which represented at a time value (theorem are in trouble). appeared at a time when Chancer was in trouble with the government, and this fact, taken in conwith the government, that this fact, taken in conjunction with Chancer's expressed dislike (Introduction to the Man of Lawes prologue) to a certain kind of scusational stories—of 'unkynde ('unnatural') abhominacionus,' which he exemplifies by the stories of Canace and Apolliums of Tyre—two of the lest told tales interspersed in the Confessio Amantis—led Tyrwhitt to the conjecture that the friendship between the two poets was that the friendship between the two poets was interrupted in their old age. But in this there is really no ground for any inference further than that Gower was merely a timid and time-serving man; while the conjecture is completely demolished by the discovery that Chancer's poem was written first (before 1385), and by the fact that Chancer took the substance of the Man of Lawes Tale direct from Nieholas Trivet's French prose chronicle of the Life of Constance (written about 1334), and of the life of Comstance (written anout 1334), that not indirectly through Cower's version of the same, as was supposed by Tyrwhitt, Wright, and most scholars down to the appearance of Mr Brock's English translation of Trivet in Originals and Analogues of some of Chancer's Contexbury Tules, published for the Chancer Society (1872-75).

published for the Chaucer Society (1872-75). Gover wrote three large works in as many languages: the *Speculum Meditantis*, in French verse, not now extant; the *Por Clamantis*, a tedious poom in Latin elegiae verse, written 1382-84, describing the rising of the mole under Wat Tyler in 1381, full of dreary allegorising and moralisation (edited by Rev. II. O. Coxe, Roxburghe Club, 1850); and the long poem entitled *Confressio Amantis*, written tip our Euclidean for England's sake. written in our English . . . for England's sake, the date uncertain, but at least the poem in existence in 1302-03. In a passage in the earlier edition of the last work, dedicated to Richard II., he tells us how he met the king's harge one day when rowing down the Thames at London, and how the king invited him on board, and commanded him to write a book upon some new matter. There are extant also fifty French ballads, written by Gower in his youth (Roxburghe Club, 1818).

Gower's Confessio Amantis consists of a prologue and eight books, written in verses of eight syllables, rhynning in pairs. The long prologue gives a sombre account of the state of the world at that time, and the poem opens by introducing the author himself in the character of an unhappy lover. Venus then appears to him, and appoints her priest called Genins to hear the lover's confession of all the sins he has committed against love. Under each several head the confessor consoles him and gives him warning by relating apposite stories of the fatal effects of each passion in the experiences of former lovers in like case. It ends with the lover's petition in a strophic poem addressed to Venns, her judgment, and finally the lover's cure and absolution. The stories inserted Alexander the Great, from the Pantheon and Speculum Regum of Godfrey of Viterbo, the romance of Sir Laucelot, and the Chronieles of Cassiodorus and Isidorus. The mixture of Ovidian and Christian and Isidorus. and Christian morality is often incongruous enough, and Christian morality is often incongruous enough, like the university, of a graduate is indicated and the whole poem is dull and prolix to the last by his hood. The gowns of under-graduates are degree. Without originality, narrative power, now black, except at Glasgow, Aberdeen, and

pathos, or humour, Gower yet commands respect for the laborious equality of his verse, and his work remains a splendid monument of English. Mr Lowell is too severe upon his uniformity of commonplace, his omnipresent tediousness, his imperturbable narrative, the tremendous hydranlic power of his allegory to squeeze out all feeling and freshness, the frozen levels of his verse, and the inevitable recurrence of his rhyme regularly pertina-cious as the tick of an eight-day clock; although indeed it cannot altogether be denied that 'he has positively raised tediousness to the precision of science, and has made dullness an heirloom for the students of our literary history.' The best edition is that by Dr Reinhold Pauli (3 vols. Loud. 1857). There is a serviceable reprint by Professor Herry Morley in his 'Carish ooke Library' (1889).

Gown, a loose upper garment worn by members of universities, civil magistrates, and the like. The use of the gown by ecclesiastics has been erroneously derived from the custom of the friars, but is more probably to be traced to the practice of inviting doctors of divinity to preach, and to the power of the university to license graduate preachers. Originally the gown was merely the ont-of-door dress; and after the Reformation the clergy (mostly Puritan) who did not hold degrees, regarding enviously the comely wide-sleeved gown which was the mark of the graduate, adopted a gown of their own or of Genevan devising, 1444 all doctors and graduates of the Benedictine order were anthorised to use their scholastic habit order were anthorised to use their scholastic habit when preaching before a large congregation; and in 1571 the gown formed part of the preacher's 'common apparel abrode.' Addison, in the Spectator (1714), speaks of the clergy 'equipped with a gown and a cassock;' and both gaments were retained until within the 19th century. In Edinburgh, at the coronation of Charles I., the Archbishop of Glasgow and others not engaged in the service 'changed not their habit, but were their black gowns without rochets or sleeves;' but in the same year a warrant was sent down from London, directyear a warrant was sent down from London, directing the use of the 'whites' by hishops and architichur. ing the use of the 'whites' by histops and archibishops, and ordering all inferior elergymen to preach in their black gowns, but to use their surplices while reading the prayers and in other services. In the 18th century, however, even during the service, the surplice was almost unknown in the Scottish Episcopal Church. The controversy in the Anglican Church as to exchanging the surplice for the gown in preaching, which arose about 1840 and excreised the church for a generation, has never received a definitive settlement.

The academic gown is a sarvival of the tubardus, a garment with many folds, which came in when the doctors began to wear long, priestly robes as a distinctive mark of their standing as elerics. At Padna, for instance, certainly as early as the 16th century, the gown and square cap were the insignia of a doctor; and, at a later period, the undergraduate of Trinity College, Cambridge, were a gown of violet colour to distinguish him from the doctors, who were a scarlet gown. The puple gown common to all rectors of universities has been described as the livery of the popes; in the words of the Emperor Joseph II., it is a reminiscence of 'the dark times when the papal see arrogated to itself the exclusive right of establishing universities.' On the Continent the several faculties passess distinctive colours, although in some universities, as at Leipzig and Tübingen, only two colours have been used. In Britain a similar custom obtains in the full dress of doctors; the faculty,

St Andrews; but in some of the English universities surplices are worn in college chapel on Sundays and saints' days. University preachers in England wear academic gowns. In the United States there is no distinctive academic dress. See Notes and Queries, 5th series, vol. xi.; and a paper in Prof. Delitzsch's Iris (Eng. trans. 1889).

Gowrie, Carse of. See Peithshire.

Gowrie Conspiracy is the name given to one of the most singular episodes in the history of Scotland, although, the very existence of a plot is still a matter of controversy. As set forth by James VI., the details of the conspiracy are as follows. Early in the morning, on Tuesday, 5th Angust 1600, as his majesty was about to begin a stag-hunt in Falkland Park, Fife, Alexander Ruthyen came to him with the information that, as he was walking alone near Pertle, on the previous evening, he had met and seized an individual of suspicions appearance, with a pot full of foreign gold hidden under his clonk. After laving confined him in 'a privy derned house,' he had bastened to Falkland to lay the matter before the king, and to rankand to my the matter beare the king, and to request him to ride over to Perth for the purpose of taking possession of the treasure, and of examining the mysterions stranger. Though at first disinclined to believe the 'uncouth' story, James was ultimately induced, by the thought that the foreign money might betoken an agent of the pope and the Jesuits, to promise that he would accompany Ruthren to Perth. This he did at the close of the hunt, not watting to change his horse, and riding at such speed that his attendants, amongst whom were the Duke of Lennox and the Earl of Mar, did not overtake him till within a short distance of the city. At Perth he was received by Ruthven's brother, the Earl of Gowrie, in such a manner as to make it appear that the visit was wholly unexpected, and kept waiting a long time before any refreshment was offered him. After his own dinner, and whilst the gentlemen of his retinne were still at table, James was taken by Ruthven through several rooms to a small study, which was situated on the first story, and of which one of the windows overlooked the courtyard of Gowrie House and the other a public street. On crassing the threshold other a public street. On crossing the threshold the king beheld 'not a bound man, but a free man, with a dagger at his girdle. At this moment Ruthven, having locked the door, snatched the armed man's dagger and held the point to the king's breast, telling him that he was now a prisoner, swearing many bloody oaths that if he cried or made any attempt to open a window the dagger would go to his heart, and, further, reproaching him with the murder of the first Earl of Gowrie, who had been executed for treason in 1584. At this James began to expostulate with Ruthven, who so far relented as to leave the king in the armed man's keeping, while he himself went ont to consult his brother, the earl. During his absence James questioned the armed man, who protested that he had been thrust into the room without knowing for what purpose, and who willingly obeyed the order to open one of the windows, the king himself, sempulously faithful to a promise extorted from him by Ruthven, heing unwilling to do so. In a few moments Alexander returned, and, declaring that there was no help lint that the king must die, produced a garter with which he attempted to hind his hands. A fierce struggle ensued, during which the armed man stood behind the king's back, 'doing nothing but trembling all the time,' and of which the result was that James was able to reach the open window and to call for help. Whilst this was resigned in and to call for help. Whilst this was going on in the study, a servant of the household had entered

the hall where Gowie still was with Lennox, Mar, and the other courtiers, and informed him that the king had ridden off to Falkland. At this the whole company hastily rose to follow, and had reached the street when the king's cries were heard. Lennov, Mar, and the other attendants at once turned back and made for the upper story by way of the main staircase, but were prevented by a barred door from reaching the king. John Ramsey, a royal retainer, had also heard his master's a royal rectater, had also need in masters voice, and, finding a door open at the foot of the turret, at once entered and ian up the winding stairs. They led directly to the study, of which Ruthven had forgotten to close the entrance, and in which the land-to-band struggle was still going on. Drawing his hunting knife Ramsay twice stabbed the king's antagorist, who, loosing his hold, was thrust down the stairs by James and despatched by Sir Thomas Erskine and Dr Herries, who were at that moment coming up; his last words were 'Alas, I had m wyte (blame) of it.' Scarcely lad this taken place when the Earl of Gowrie appeared on the scene, bearing a drawn sword in each hand, and followed by seven of his servants. A short encounter ended with the death of the earl, who expired without uttering a word. The inhabitants of Perth, by whom Gowrie, who was their provest, was much beloved, hearing of his fate, surrounded the house and threatened revenge. Dut after the king had addressed them from a window, and admitted the magistrates, to whom he related the circumstances, they quietly dispersed, and James was able to return to Falkland. On the anthority of the king's declaration Gowrie and Ruthven, whose dead badies were produced at the bar, were declared traitors, and three of their servants were hanged. On the other of their servants were hanged. hand, marks of royal favour were bestowed on all who had come to the king's assistance in the study. Ramsay was knighted, and subsequently created Viscount of Haddington and Earl of Holderness; Sir Thomas Erskine was ruised to the peerage as Lord Dirleton, and Dr Herries received the honour of knighthood as Sir Hugh Herries of Cowshud. Henderson, the 'armed man,' after having obtained a free pardon, was rewarded with a gift of lands and a large pension.

To the events of 1600 there was a sequel a few years later. In 1608 George Sprott, a notary in Eyennouth, was apprehended, condemned, and executed for being privy to a conspiracy between Gowrie and Robert Logan of Restulrig. He confessed to having seen several letters written by Logan to the earl, and to having retained one of them, but no document of the kind alluded to was actually put in at the trial. Next year, however, there were produced five letters, said to have been discovered antongst Sprot's papers, and alleged to contain proof of a plot to kidnap the king. On the strength of them Logan, who had died in the meantime, but whose mouldering bones were dug up and brought to trial, was declared to have been guilty of high-treason. From the very first the story of the conspiracy was received with incredulity by many in Scotland, and amongst these by the elergy of Edinlurgh, with Robert Bruce at their head, and by the queen herself; whilst the Duke of Lennox, though he had appeared as one of the chief witnesses at the trial, assorted that 'if it were given to him to his oath, he could not say whether the practice proceeded from Cowrie or the king.' In England Elizabeth, on being informed by a special messenger of what had taken place, gave him to understand that she 'did not believe Gowrie and his brother to be so guilty as they were represented.' In France James's statement was openly ridienled. This attitude of scepticism is still

maintained by some writers, who point out that, with the exception of Burton's general remark that 'scizing upon or kidnapping a king had in that day become almost a constitutional method of effecting a change of ministry in Scotland,' downie or Ruthven could benefit by the king's munder or captivity, whilst by the death of the earl and his brother James was freed from a debt of over £80,000, and rid of a political opponent in the person of the one, and possibly of a rival in the queen's affection in that of the other; that, whilst there is no trustworthy evidence to prove the interview in Falkland Park to have been of Ruthven's seeking, the king very shortly before lad sent letters to both the brothers; that, whilst the reason alleged by the king to account for his visit to Gowrie House is palpably absurd, that given by Ruthven, who ascribed it to the matter of the debt, is reasonable; that the point which tells most against Gowrie—viz. his conduct on secreiving the false information of James's departure for Falkland—is not inconsistent with innacence; that the position of the study to which the king was taken makes it incredible that it could have been selected for a criminal purpose; that in his various statements Henderson, who was produced as being, but was not generally believed to have been, the 'armed man,' contradicted not only the king and Ramsay, but hinself as well; that Ruthven's dying exclamation, 'Alas, I had un wyte (blame) of it, may reasonably be looked upon as referring to the origin of his struggle with the king; that Sprott, whose confession was the only evidence connecting Gowrie and Restalrig, was looked on as a madman by the king's warmest sympathisers; that the famous letters were not praduced at his trial; that in the following year they did not at first convince the jury, who brought in a verdict of guilty against Logan only after they had been remonstrated with by the Earl of Dunbar; and, finally, that those letters bristle with discrepancies, contain no proof of a plot for the abduction of the king, whom they do not even mention, and cannot, from their dates, be made to refer to any event intended to take place till long after the 5th of August. There is yet another view adopted by those who, whilst admitting the innocence of Gowrie and Ruthven, find it difficult to believe that the king devised a plot in which he was himself to play a dangerous part. It is in substance the same as that set forth at the time by Sir William Bowes, the English agent in Education burgh, in a letter to Sir John Stanhope. It is to the effect that there was no conspiracy on either side, but that the struggle in the study arose out of some sharp words that passed between the king and Ruthven concerning the execution of the latter's father, and that all the subsequent events were in part contrived, in part utilised, for the purpose of giving James's conduct what Bowes calls 'an honourable cloak,' See Louis A. Barbe's Tragedy of Gowrie House (Paisley, 1887).

Goyana, a town of Brazil, 40 miles N. by W. of Pernambuco, with a large Carmelite monastery, and flourishing sngar-plantations. Pop. 10,000.

Goya y Lucientes, Francisco, the most distinguished painter of the new Spanish school, was born at Friente de Todos, in Aragon, 30th March 1746, and received his first education in art in the academy at San Luis, Saragossa. On his return from a visit to Rome, the talent and speed with which he excented some paintings for the royal tapestry manufactory gained the approbation of the celebrated Mengs, who superintended that work. His scenes from the common life of the Spanish people excited special admiration. In

1780 he was elected member of the academy of San Fernando. From this time, although he remains in all his work a thorough Spaniard, the influence of Velasquez and Rembrandt is observable in his paintings. Among the most celebrated of these is his portrait of Charles IV., for which he was made count-painter. In 1824 he went to Paris for his health, and continued to reside in France till his death, which took place at Bordeaux, 16th Amil 1828. See Lives by Yriarte (Paris, 1867) and Lefort (Paris, 1877).

Goyaz, the central province of Brazil, falls within the dry plateau region, rising in the south to an important range of mountains (see Brazil), and has an area of 287,430 sq. m. The river Tocautins traverses most of the province from south to north, and receives the Aragnay, which forms the western boundary; the southern frontier is marked by the Paranahyba. The climate in the south is healthy, but in the north malignant fevers are common, and the eattle are subject to goitte. The province had once some fame as a source of gold and diamonds; but these products are exhausted, and its deposits of iron and rock-salt are not worked. Stock-raising is the chief industry, the eattlemen being mostly half-civilised raqueiros. The population was estimated in 1888 at 211,721, mostly half-castes. There are also several thousand wild Indians.—The capital, Goyaz, on the Vermelho, a tributary of the Aragnay, preserves, in its cathedral and large government buildings, traces of better days. Pop. 8000.

Gozo (called by the Romans Gaulus), an island in the Mediterranean, lying 4 miles NW. of Malta and belonging to Britain, has, with the adjacent smaller island of Comina, an area of 20 sq. m. and a pop. (1881) of 17,620. The surface is hilly, but the soil is fertile. The chief town is Babato, situated near the centre of the island. The history of Gozo is identical with that of Malta (q.v.).

Gozzi. Count Carlo, Italian dramatist, was born at Venice in March 1722. The publication of several slight but witty and satirical pieces made him known in his native city, and the part he took in combating the theatrical innovations of Chiari and Goldoni made him famons. For the purpose of commeracing the attempts of these two writers to free the Italian stage from the pnerilities of the Commedia dell' Arte by the introduction of translations of newer French dramatic works, Gozzi wrote a satirical poem, Tartana degl' Influssi per l'Anno Biscstile (1757), and a comedy, Fiaba dell' Amore delle tre Melarancie (1761). In this last work he struck a vein which for a time proved to be extremely popular, and he wrote several similar 'dramatic fairy-tales,' as he called them, the best being L'Augellino Bel Verde. But the best known, from Schiller's translation of it, is Turandot, which Gozzi himself borrowed from a Persian sounce (Nizumi). His latest dramas were modelled upon those of Calderon, but they enjoyed only a moderate success. Gozzi died 4th April 1806. In 1772-74 he edited a complete collection of his own works in 10 vols.; but a fuller edition came out at Venice in 14 vols. in 1802. See his Memoirs (1797; Eug. trans. by J. A. Symonds, 2 vols. 1889).—His brother, Count Gasearo Gozzi, was born at Venice, 20th December 1713. His first attempts in literature, the translation of dramas from the French for production in the theatre of Sant' Angelo at Venice, were not successful. But his next ventures, the editing of two journals, Gazetta Feneta (from 1760) and Osservatore Feneto (from 1761), to which he contributed very copiously, established his fame as one of the most elegant writers of literary Italian. The second of these works was an attempt to

imitate the English Spectator. For some time Gozzi was press censor in Venice. He died at Padua, 26th December 1786. Besides the works named he also wrote Il Mondo Morale (1760), a collection of essays; Lettere Famiglian (1735); and Giudezio degli Antichi Poeti sopra la Moderna Censura di Dante (1738), a defence of the king of Italian poets against the strictures of Bettinelli. Collected editions of his works were published at Venice (12 vols. 1794-98, and 22 vols. 1812).

Gozzoli, Benozzo (properly Benozzo di Lese), an Italian fresco-painter, a pupil of Fra Angelica, was horn at Florence about 1420. At Montefulco (1450-52) he painted the 'Vingin giving her Girdle to St Thomas' in S. Fortmato, and a series of frescoes albestrating the life of St Francis, an Annunciation, and a Chedificion, in the monastery of S. Francesco. At Florence (1456-64) he adorned the Palazzo Riccardi with scriptural subjects, and painted various similar frescoes at San Gemignano (1464-67). His name is likewise infinately associated with a series of twen(r-form line frescoes in the Campo Santo or conetery at Pisa (1468-84). He died at Pisa in 1498. His works show great individuality of treatment, true landscape feeling, and something of the naturalistic tendencies of Fra Filippo. See an article by Stillman in the Century for November 1889.

Graaf, Regner de, a Dutch physician and anatomist, was born at Schoonhoven, 30th July 1644, studied at Leyden under Dubois (De le Boè), better known as Sylvius, and afterwards un France, taking the degree of doctor of medicine at Angers in 1665. The year after he settled at Delft, where he practised until his death, 17th August 1673. In 1663 he wrote Disputation Medica de Natura et Usu Succi Paurcatici, which gained him a great reputation. In the course of his investigations in abdominal anatomy he discovered, in 1672, the Graalian vesicles or follieles of the female ovum (see OVARY). He wrote several dissertations on the organs of generation in both sexes, which involved him in a prolonged and angry controversy with Swammerdam. His Opera Omnia were published at Leyden in 1677, and republished in 1686 and 1705.

Graafian Vesicles. See OVARY.

Graaf-Reinet, a town of Cape Colony, nearly girdled by the Sunday River, 185 miles N. of Port Elizabeth by rail. Founded in 1784, it still preserves the quaint and simple characteristics of the old Dutch town; and with its vineyards, orchards, and gardens, in contrast to the burning karroo plains that encircle it, it has been well called 'the gem of the desert.' The streets are wide, with rows of oak, orange, and other trees, and broad channels of running water; the houses white, with overhanging thatches and broad 'stoeps.' Behind it the Successful Pop. 5000.—The division of the same name has an area of 3792 sq. m., and a population of about 17,000.

Gracchus, the name of a Roman family, of the gens Sempronia, which contributed several famous citizens to the state: (1) Tiberins Sempronius, a distinguished opponent of Hamibal in the second Punic war, who fell in battle against Mago, 212 n.c., and was honoured by Hamibal with a splendid funeral. (2) Tiberins Sempronius, the father of the two tribnues whose fame has overshadowed all the others. He was born about 210 n.c., filled successively all the high offices of state, conquered the Coltiberi, and by his kindly treatment of the Spaniards carned their lasting gratitude. He narried Cornelia, the youngest daughter of P. Scipio Africanus, who bore him twolve children, of whom all died in youth save a daughter, Cornelia, who married P. Scipio Africanus

the younger, and the two illustrious sons whose bistory follows.

TIBERIUS SEMPRONIUS GRACCHUS was born about 168 B.C., and was educated with great care by his excellent mother, his father having died by his excellent mother, his father having died white he was yet very young. He was already a distinguished soldier when in 137 he served as quaster to the army of the consul Mancinns in Spain, where the remembrance of his father's honour, after forty years, enabled him to gain better terms for the 20,000 Rooma soldiers who lay at the mercy of the Namantines. But the peace was repudiated at Roue, and Mancinns was stripped and said sent hach to the Namantines. stripped naked and sent back to the Numantines, as if in that way the treaty could be rendered void. The hopeless poverty in which thousands of the Roman citizens were sunk now began to weigh upon the mind of Goacelus, and cre long he plunged into an agitation for reform to which he was soon to sacrifice his life. Elected tribune of the people in 133, he endeavoured to reimpose the agratian law of Licinius Stolo, and after violent opposition on the part of the aristocratic party, who had bribed his colleague M. Octavius Cacina, who had birbed insteading a bill to that effect. Tiberius Gracchus, his brother Cains, and his father-in-law Appius Claudins were appointed triumvits to enforce its provisions. Meantime triumvits to enforce its provisions. Meantine Attalus, king of Perganus, died, and bequeathed all his wealth to the Roman people. Gracelus therefore proposed that this should be divided among the poor, to enable them to procure agricultural implements and to stock their newly-acquired farms. It is said that he also intended to extend the frunchise, and to receive Italian allies as Roman citizens. But fortune turned against the good tribune. He was meaned of having violated the search character of the tribuse. having violated the sacred character of the tribung-ship by the deposition of Cagina, and thousands of the fickle mob deserted their champion and benefactor. The selfish and unscrupulous aristocrats factor. formed a ring for his destruction, a bad eminence in which belonged to P. Corn, Scipio Nasica, In the midst of the next election for the tribmuship Tiberius Graechus with some hundreds of his friends was foully murdered.

Catus Semimonus Gracenus was nine years younger than his brother, and had greater natural powers and wider aims. His brother's death occurred while he was serving in Spain under Scipio Africanus, and deterred him for some years from entering into public life, but at length he mexpectedly returned to Rome, urged by his brother's shade to take up his mission. Ho stood for the tribmucship, and was elected in 123, and a second time the year after. His first measure was to renew his brother's agranian law, which had by the muchinations of the nobles been kept in abeyance. With passionate carnestness he devoted himself to the cause of the poor, whose immediate misery he relieved by employing them upon new roads throughout all parts of Italy. But not all his noble devotion to the real good of Rome could save him from his brother's fate. By an intrigue of the senatorial party his colleague M. Livius Drusus was bribed to undermine the influence of Caius by far surpassing him in the liberality of his public measures, and by his hencifis to the commons, and consequently Chins was rejected from a third tribuneship. At the expiry of his term the senate began to repeal his enactments. Caius appearing in the Forum to make opposition, a fearful riot ensued, in which it is said as many as 3000 of his partisans were slain. Caius held aloof from the fight, but was at length compelled to seek safety in flight. He escaped to the grove of the Furies with a single slave, who first slew his master and then himself. The people

saw too late the folly of which they had been guilty in abandoning their best friend in the hour of need, and endeavoured to atoms for their crime by creeting statues to the two brothers, by declaring sacred the spots where their blood had been shed, and by offering sacrifices to them as to deities. Their mother survived them long, and upon her touch the Roman people inseribed the words, 'Cornelia, nother of the Gracchi.' See the articles AGRARAN LAWS and ROME.

Grace is an expression frequently used in Scripture and in theological discussion. Its distinctive meaning is the idea of free and unmerted favour. According to Aristotle, this is the proper meaning of charis (Gr., 'grace'), even when applied to man. It is a benefit springing out of the liberality and freeheartedness of the giver, and bestowed without any lope or expectation of reward. Applied to tood in the New Testament and in theology, it denotes the free outcoming of his love to man; and when man, on the other hand, is said to be in a state of grace, it implies that he is in the enjoyment of this divine love and favour. St Paul draws a sharp contrast (Rom, xi.) between charis and erga (Gr., 'works'), as mutually excluding one another. 'And if by grace, then is it no more of works: otherwise grace is no more grace. But if it be of works, then is it no more grace: atherwise work is no more work.'

Theologians have distinguished grace into common or general, and special or particular. Common grace is supposed to denote the love which God has to all his creatures, and the light of nature and of conscience which they all enjoy. Special grace is the love which God has for his elect people, and by which he saves them from their sims. This special or saving grace is sometimes also divided in various ways, and spoken of as electing, justifying, sanetifying grace; also, in respect of man, as imputed grace—the grace, that is to say, of Christ's righteomeness imputed or reckoned to the account of those that believe on him, and the grace of holy and pious dispositions wrought in the heart by the Spirit of God. Grace is also spoken of as efficacious and irresistible, and the relation in which the elect or believing people stand to God is represented as a covenant of grace, in contrast with the primitive relation which Adam bore to his Maker before the fall, which is called a covenant of grace?

Grace, DAYS OF. See BILL OF EXCHANGE.

Grace at Meals (Lat. gratice, 'thanks'). It was the custom of the Jews to give thanks at table, and Our Lord 'blessed' or 'gave thanks' before distributing the loaves and fishes, and again before and after the Last Supper. That it was the general practice of the early Christians to give thanks, seemingly at every meal, is evident from the writings of St Paul and of the Fathers. The Gelasian Sacramentary (end of 5th century) contains probably the most ancient graces of the Latin Church now extant. At Clifford's Inn the 'acted grace' consisted in the raising three times, in allusion to the Trinity, of four loaves, representing the four gospels, which the president then propelled along the polished tables to the vice-chairman, to symbolise the spread of the gospel to the heathen. The canon Non Nobis, Domine by William Byrd (q.v.) is often sung in England at public dimers in place of a grace after meat. The old college grace, 'Benedictus benedicatir,' may also be mentioned.

Graces (Lat. Gratice, Gr. Charites), divine personifications of grace, gentleness, and beauty, usually described as danghters of Zens, who are given by Hesiod as three in number: Aglaia, Thalia, and Enphrosyne. The carliest concep-

tion seems to have been but one aspect of Aphrodite; the division into a plurality of beings came later. Originally the Lacedenonians had only two Charites, Cleta and Phaenna; the Athenians also had but Hegemone and Auxo. In the early ages the graces were represented in elegant drapery; at a later period slightly draped, or entirely under usually holding each other by the hand, or locked in each other's embrace.

Grackle. See Graker.

Gradient, a term used chiefly in connection with railways, to signify a departure of the line from a perfect level. See RAILWAY.

Gradisca, a town of Austria, on the Isonzo, 25 miles NW, of Trieste. First fortified by the Venetians in 1478, Gradisca, with its territory, came into the hands of Austria in 1511, and during the next century and a half figured frequently in the wars between Austria and Venice. In 1647 it became a principality of the empire, but lapsed to the imperial crown again in 1717, and in 1754 was united to Gorz (q.v.). Pop. 1564.

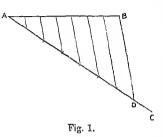
Gradual, an antiphon, introduced into the service of the Mass in the 5th or 6th century, sung after the epistle, and so called either from the altar-steps (gradus), where it was formerly sung, or because it was sung while the minister ascended the steps of the Ambu (q.v.) where the gospel was read. From Septuagesima to Holy Saturday the 'allelnia' with which the gradual is followed is replaced by a mournful chant called the Trace. The words of the gradual are nearly always taken from the Psalms; and they are invariably sung to 'plain channt' melodies, the compositions under this title of Haydn, Mozart, and others being graduals in name only. These melodies are contained in the Gradual (Old Eng. Grade), a volume of ritual music intended chiefly for the choir, and containing all the plain channt melodies appointed for the service of mass throughout the year.

Gradual Psalms, or Songs of Degrees, a name given both by the Hebrews and in the Christian service books to the fifteen psalms, 120-134 (119-133 in the Vulgate). The origin of this name is uncertain. The oldest explanation makes it an allusion to the fifteen steps between the courts of the temple, on each of which a later rabbinical tradition asserts that one of the psalms was sung; and others, again, have regarded these psalms either as containing a prophetic allusion to the return from captivity, or as having been sing in the 'going up' from Babylon. But the tradition has no support apart from the Talmud, and carries a suggestion of having been invented to meet the case; while the plural number of the title, 'goings up,' is against the second explanation. A third emjecture, which has more to recommend it, supposes that the psalms were sing by pilgrins when going up to Jerusalem for the great annual feasts. In the Roman Catholic Church they are recited on all Wednesdays in Lent, except the last.

Graduation. By the term graduation is uneant those processes by which linear scales and circles, or circular arcs, are divided into any required number of parts. Such methods are constantly employed in the division of the scales of barometers, thermometers, cathetometers, reading arcs or circles of theodolites, sextants, telescopes, nural circles, spectroscopes, and in many other instruments where precision and accuracy of measurement is uncessary. Since any mechanical process for executing such division must be preceded by some independent original graduation of the mechanical instrument itself, it is obvious that all methods of graduation must ultimately depend upon some original graduation. The subject may

therefore be considered first in reference to original graduation; and afterwards the reproduction, by band or machine, of originally graduated lines or arcs may be dealt with.

The most elementary process in original graduation is the operation of dividing a line into a given number of equal parts. Let AB (fig. 1) be a line:



it is required to divide it into, say, seven equal parts. From A draw AC, making any convenient augle with-AB, and on AC lay off with compasses or a scale seven equal distances from A. Join BD, supposing D to be

seven equal distances from A.

Fig. 1.

Join BD, supposing D to be at the end of the seventh part on AC, and through the other points of division of AC draw lines parallel to BC. These will ent AB into seven equal parts. In practice, however, this method is not very accurate and is not often employed. In another method, that known as continual bisection, the length of half the line is laid off, by means of the beam-compass, from both ends; these lengths from the two ends should agree in one point as being the middle point of the line; if they do not, then the point midway between them is taken as being the middle point, and is found by means of a pair of fine compasses and a lens. Each half of the line is, by the same means, halved again, and so on until the required number of divisions is obtained. Similar division of a straight line may be obtained by laying off, by a pair of spring-dividers, one after another, from one end of the line, the smallest part required. Obviously, if there is any orror in the first distance thus laid down, it will be multiplied in the last in proportion to the whole number of divisions. This method is known as stepping.

The original graduation of circles or of circular arcs is a matter of some difficulty, as it requires on the part of the operator such skill, patience, and care as is possessed by few. In this connection the names of Graham, Bird, Troughton, Ramsden, and Simms may be mentioned as those whose work has been of high value to the astronomer and physicist. The first method which may be described by which a circle can be divided is practically the same as that of bisection in the case of the straight line. Since the chord of an arc of 60° is equal to the radius of the circle (the chord and two radii to its extremities forming an equilateral triangle), if this length be laid off from any point on the circle an angle of 60° is thereby determined. The half of this angle may be obtained, and when added to 60° forms the quadrant or 90°. Continual bisection of 60° gives the smaller divisions of degrees and fractions of a degree. Troughton's method depends on an entirely different principle. A cylindrical roller is employed, whose dimensions are such that in rolling on its axis once round the autside edge of the circle it revolves sixteen tinnes. The edge of the roller is itself divided into sixteen equal parts by ropeated bisection. It is then held firmly by a frame against the edge of the circle, so that, on being moved always tangentially to the circle, it revolves on its axis round the edge of the circle. In doing so marks are made on the edge of the circle. In doing so marks are made on the cage of the circle. In doing so marks are made on the circle of these intervals into degrees and minutes is effected by means of a subdividing

sector, placed concentrically, and rolling with the roller. For the details of the manipulation of this sector reference may be made to Troughton's paper in the *Philosophical Transactions*, 1809.

The reproduction, or copying as it is termed, of graduated straight scales, circles, or circular arcs, by copying them from patterns originally graduated with great accuracy, may be done by hand or by mechanical contrivances. In copying a straight scale the 'work'—i.e. the piece of metal or other material whose division is required—is laid parallel to and flat with the pattern whose graduation is copied. A straight-edge is laid across both, so as to coincide with one of the divisions in the pattern, and the dividing knife is drawn carefully along the edge, and across the work. In copying circles the work is screwed firmly down on and concentric with the pattern; the dividing knife is then used in the same manner as in copying straight scales, hoing guided by an index steel bar, the edge of which is exactly coincident with a radius of the circle.

Capying is now more usually effected by instrumental means, the machines for this purpose being the linear and circular dividing engines. In the linear dividing-engine the principal part is a carefully turned screw, which revolves in bearings in unity turned serew, which revolves in bearings in two supports. Connected with the screw is a crank handle and a disc whose plane is perpendicular to the axis of the screw, and whose flat edge is divided into a number, usually 400 or 500, of equal parts. As the handle is turned the screw rotates, but does not move in the direction of its length (it may, therefore, for distinction be referred to as the fixed screw). At the same time the disc also revolved. serew). At the same time the disc also revolves, and each division on its edge passes an index line on a part of the support close to it; the number of complete turns and fractions of a turn of the serew may thus be easily counted. If, now, the fixed serew pass through a hollow travelling unt or serew, the latter will move backwards and forwards according as the fixed serew is rotated one way or the other. Thus, e.g., if the 'pitch' of the fixed serew be one millimetre, and the handle be turned ten times and a little more, corresponding to lifty-six divisions (of which let there be 500) on the and anything there may be in connection therewith, will advance through $10_{6.0}^{6.0}$ num.—i.e. 10.112 nm. The handle is so connected with a ratchetwhicel that the fixed screw can only be rotated in one direction, so that the travelling serow can only Attached to the travelling-screw is the dividing-apparatus, which is a light frame supporting a vertically-placed steel needle, with a fine, hard point, and capable of a to and-fro motion in a horizontal line at right angles to the fixed screw. This needle serves as a marker whereby divisions may be made on any object whose graduation is desired. For instance, to divide a given length into a certain number of equal parts, the travelling screw is allowed to advance, by turning to the requisite amonat, so that the point of the needlo, starting from one end of the line, moves through a distance equal to one of the equal parts. A mark is then made with the needle; the travelling-serow is again advanced through precisely the same distance, and another mark is made; this process is continued until the whole length is divided. The length of mark made by the steel point may be adjusted, within certain limits, by increasing or decreasing, by screws, the range of the marking-point. In addition to this, however, it is desirable in some cases to make every tenth mark longer than the others, excepting the fifth, which may be inter-mediate. This is effected by a wheel whose circumference is cut up by rectangular notches, into

which one part of the frame holding the needle fits when at the end of its possible range of motion; when at the end of its possine range of motion, every tenth notch being deeper than the others (except the fifth as above), the range of marking lower in this ease than the others. This wheel is longer in this case than the others. This wheel is turned by ratchet-work in the to-and-fro motion of the marking-point. The carriage attached to the travelling screw may also support a small reading microscope: thus the linear dividing engine may be used to test with great accuracy the dis-tance between two points, each lying at the inter-section of the cross-wires in the field of view; all that is necessary is to focus one of the points, count the number of whole and fractional turns of the screw required to bring the second point into focus,

and thus the distance may be obtained.

For the purpose of dividing circles the circular dividing-engine is employed. This instrument was first constructed by Ramsden, afterwards improved by Troughton, and more recently by Simus. The essential features of a circular dividing-engine are a circular plate carefully divided by original gradua-tion, and capable of rotation on its axis; a tangent tion, and capable of robation on its axis, a tangent screw, working in a ratched edge of the circle, and thus capable of turning it through any required angle; a dividing-knife worked radially, so that, when the tangent-serew turns the circle through successive equal angles, radial lines may be drawn

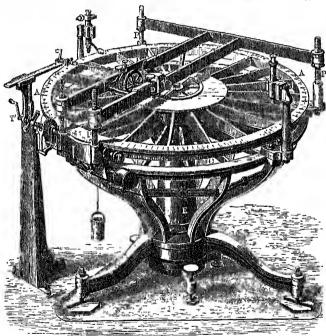


Fig. 2.-Dividing-engine.

on any work laid on the divided eirele, on any work and of the instrument. A, A is the circle, usually 4 or 5 feet in diameter, divided at its edge, and ratched into teeth at its lower edge, C. The axis of the circle is in the column, E. TT' is the tangent-screw; T', a handle for turning it; T, a dise-shaped head, the divisions on the circumference of which allow of the number of whole and fractional turns of the the number of whole and fractional turns of the screw being counted. The carriage, D, in which works the dividing-knife (not seen in the figure), may be adjusted to different heights by the screws on the pillars, P, which support the parallel beams on which the dividing-knife earriage moves; it may also be adjusted to circles of different radii

by moving the carriage along these beams to the requisite amount from the centre. When in action the tangent-screw is pressed against the ratched edge of the circle by a handle, K, with an eccentric knob. This pressure may, of course, be relieved when the screw is not in use. The tangent-screw is sometimes turned by a treadle, or even by clock-work. Its pitch being accurately known, the angle through which the circle turns, due to one revolution of the tangent-screw, as noted by the divided head, T, is determined once for all for any machine. The work to be divided is fixed down on and concentric with the circle, A; a mark is made as origin with the dividing-knife, the tangent-screw is then made to turn the circle through one of the smallest divisions, and another mark is made; another equal turn of the serew is made and another mark cut on the eircle, and so on until the division of the whole circle is completed. This is the method by which the large circles used in astronomical instruments are graduated, and such is the perfection to which these have been brought that the circular dividingengine may be looked upon as being one of the most perfect of scientific measuring instruments.— For graduation in universities, see Degrees, UXI-VERSITY.

Gradus ad Parnassum (Lat., 'a step to Parnassus'), a dictionary of prosody used in making

Latin and Greek vorse. The best known is the Latin one by The John Carey, LL.D. (1756-1826), teacher of the classies and author of school-hooks, which was published in 1824,

Græcia, Magna. Magna Græcia.

Graf, the German equivalent for Count (q. v.).

for Count (q,v.).

Graf, KARL HEINRICH, professor at Leipzig, a disciple of
Reuss. His name is commonly
attached to the theory of the
Pentatench first formulated in
1822 by Reuss. Graf's Dic 1833 by Rens. Graf's Die geschichtlichen Bucher des Alten Testuments (1866) first called general attention to the theory already set forth independently at Berlin by Leopold George and Wilhelm Verlie in October 1825. Wilhelm Vatke in October 1835. In that work he maintained that as to their ritual legislation the middle books of the Pentateuch bore in themselves the clearest traces of their post-exilic author-ship.' The objections offered by Richm and Nölleke, on the one hand, to such a division of the Grund-schrift, or 'main-stock,' and the fuller evidence furnished by Hupfeld and Kuenen on the

other, led Graf to his later view, that the whole of 'the so-called Grand-schift of Poutotenel' was written after the exile. This Pentateuch' was written after the exile. This appeared shortly before his death (16th July 1869) in pp. 466-477 of Merx's Archiv für Erforschung des Alten Testaments (vol. i. 1869). Graf wrote also De Templo Silonensi (1855), Der Segen Moses erklärt (1857), Der Stamm Simeon (1866), Zur Geschichte des Stammes Levi (in Merx's Archiv, vol. i.). See PENTATEUCH.

Gräfenberg, a village in the north west corner of Austrian Silesia, 50 miles N. of Olmütz. It is celebrated as the spot where the water-enre (see HYDROPATHY) was introduced in 1826 by Vincenz Priessnitz (1799-1851). It still is visited yearly by some 1500 persons.

Graffiti (Ital. graffito, 'a scratching'), or Wall-SCRIBBLINGS, the name given to certain classes of mural inscriptions and drawings found at Pompeii, Rome, and other ancient cities in Italy. They are generally scratched, with a stylus or similar sharp instrument, or scrawled, with red chalk or charcoal, on walls, door-posts, and portice-pillars, and seem to be the work of idle schoolboys, loungers, triflers, and the like 'do-nothing' folk; but some were executed with more serious intention. Accordingly we find that the subjects that oftenest occur are doggerel verses, quotations from the poets, amatory

AVETIA NUA KRADIENAM

Fig. 1.—Specimen of Graffiti-Ange annat Arabicaum ('Auge is in love with Arabienus').

effusions, names with opprobajons epithets attached, coarse and often obscene words and figures, rude caricatures, especially of gladiators, of which fig. 2 is a specimen, and other instances of the thousand and odd ways in which the impulses of the restless idler prompt him to express his funcies. Amongst the more serious examples there are electioneering admonitions, play bills, and similar public amouncements, philosophic apophthegms, natices of house-hold events, time-tables of domestic work, and exchanations and sentonces of even tragic import. These scribblings and rade drawings derive importance from the fact that, like Punch and similar comic journals, they serve as an admirable index to the current life of the people, especially in Pompeii, where the greatest number of them have been discovered. Without them we should have a far less adequate idea of the street-life of the ancient Roman people. They also throw much light upon

the phrascology and idiom of the

vernacular spoken towards the end of the 1st

century A.D. in

southern Italy. Three languages,

or rather three alphabets, were

Greek, and Oscan. Of these Latin was much

monly employed. In Rome graffiti have been found on some of the

great buildings

of the ancient

the most

αf

60111-

the cities



Fig. 2.—Gladiator.

of the ancient city, as the Palace of the Casars, Nero's Golden House, and tombs on the Via Latina, as well as in the Catacombs. These hast consist for the most part of lists of mere names, pions prayers and wishes, and invocations to the martyrs. The first collection of graffiti from Pompeii was published by Bishop Christopher Wordsworth in 1837, and is reprinted in his Misrellanies (1870). All that have been discovered and published up to the present time are to be found in vol. iv. of Corp. Inser. Lat. (1871, edited by Zaugemeister under the title Inscriptiones Parietaria Pompeianae, Hervulunenses, et Stabianae) Parietaria Pompeiana, Herculanenses, et Stabianae) and the supplementary volume. The inscriptions in the Oscan characters, of which there are two varieties, as there likewise are of both the Greek

and the Latin, are not contained in the collections inst quoted; but they will be found in Fiorelli's Haser, Oscaram Apographa (1854). Compute also Garrucci's Graffiti de Pompei (Paris, 1856), and Edinburgh Review, vol. cx.

Gräfrath, a town of Rhenish Pinssia, 12 miles E. by S. of Disseldorf, with cotton and iron mannfactures. Pop. 6299.

Grafting, a mode of propagation applicable to all kinds of trees and slumbs, and even herbaceous plants whose tissues are firm. The operation consists in the inserting of a branch or bad (scion) of one tree into some part of another tree (stock), so as to bring about a mion of the two. The practice of grafting is doubtless one of great antiquity, and its origin may in all probability be traced to a natural mocess which is of frequent occurrence. It has been observed that, when two branches of a tree or branches and even the stems of kindred trees growing closely together overlap and touch each other, the bark becomes wounded or alreaded, and the returning jnices exading from the inprined vessels in the Alburum (q.v.) produce granulations by which a perfect incorporation of structure is effected, and the parts become one. The object of grafting is, first, to perpetuate and increase the stock of varieties and subvarieties of fruit trees, the innate qualities of which cannot be transmitted with certainty to their progeny by seeds, and which would be more slowly and less smely multiplied by any other artificial mode of propagation; secondly, to increase and accelerate the fruitfulness of fruittrees—for, the elaborated sap being impeded in its descent at the junction of the scion with the stock, the process of maturation is thereby promoted, and fertility more largely and quickly induced. Old and unfruitful trees, whose stems and toots are vigorous and healthy, may be rendered fruitful in the course of two or three years by having their tops cut back and re-grafted with scions from a finitful and healthy tree. Crafting is also employed for the purpose of dwarfing fruit-trees, while at the same time abnormally increasing their fruitfulness. This is attained partly by the selection of a stock which exerts a restrictive influence on the scion, and by double grafting—i.e. grafting twice or oftener at will. Very young trees are thus rendered prodigiously fruitful, and are in demand for the purpose of pot culture and planting in orchard-houses. Trees damaged by wind or otherwise have their injinies repaired by grafting, and those that are unequally balanced may be brought to perfect symmetry by the indicious insertion of scious in the ill-furnished parts.

In grafting it is particularly to be attended to that the attenue of the scion is brought into contact with that of the stock. The hard wood of the one never unites with that of the other, remaining separate and marking the place of the operation even in the aldest trees. For scions or grafts, pieces of about six to eight inches long are generally taken from the shoots of the previous summer, with several lands; lant partions of shoots of two years old are sametimes sneedsfully employed. The time for grafting is in spring, as soon as the sap begins to appear. The scion should, if possible, be taken from a healthy and fruitful tree, but scions from the extremities of lateral branches are more likely to become speedily fruitful than those from the uppermost branches, where growth is most vigorous. The scion should be kept for a few days before grafting, so that the stock may rather exceed it, not only in vigour, but in the progress of its spring growth; and for this purpose it may be placed in the ground, in a rather dry soil, sheltered from the direct rays of the sun. Scions may be kept for some time, and easily carried to a distance,

by sticking their lower end into a potato or moist moss or clay. The end should always be freshly cut off when the scion is to be used. There are



Fig. 1.-Cleft-grafting.

various modes of grafting. Cleft-grafting (fig. 1) is very commonly mactised when the stock is very considerably thicker than the scion. The stock, being cut over, is cleft down, and the graft, cut into the shape of a wedge at its lower end by a sharp thin knife, is inserted into the cleft. This mode of grafting is particularly applicable to branches

of large trees, when the introduction of a new variety of finit or increased fruitfulness is sought.—Crowngrafting is used for still thicker stocks, which are cut across, and then cleft down by two clefts crossing one another at right angles, two scions being inserted close to the bark in each cleft; or no cleft at all is made, and any desired number of scions obliquely cut away on one side are simply inserted the bark and

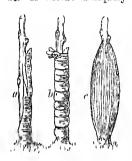


Fig. 2, a_i tongue-grafting; b_i do, with lightine applied; v_i do, with clay applied.

wood of the stock, the operation in this case being deferred till the bark readily parts from the wood. In this kind of grafting a longitudinal slit in the bark of the stock, opposite to each graft, is advantageous.—Tonguegrafting (lig. 2) is the mode most commonly practised for young trees in nurseries. For this it is necessary that the stock and the scion should be of not very different thickness.

A slit or a very narrow angular incision is made in the centre of the stock downwards, and a similar one in the scion upwards, both having been first cut obliquely at corresponding angles; and, the tengue thus made in the scion being inserted into the incision in the stock, they are fastened very closely and theroughly together. In saddle-grafting the end of the stock is ent into the form of a wedge, and the scion is affixed to it, the base of the scion having been ent or slit up for the purpose.—Shoulder-grafting, used chiefly for enamental trees, is performed by cutting obliquely, and then cutting across a small part at top of the stock, so as to form a shoulder, the scion being cut to lit it.—Peg-grafting, not now much in use, is accomplished by making the end of the scion into a peg, and being the top of the stock to receive it.

a peg, and boting the top of the stock to receive it.

Whichever of these modes of grafting is adopted the graft must be fastened in its place by tying, for which purpose a strand of bast-matting is commonly used. The access of air is further prevented by means of clay, which has been worked up with a little chopped hay, horse or cow dung, and water, and which is applied to the place of junction so as to form a ball, tapering both upwards and downwards. In France a composition of 28 parts black pitch, 28 Burgundy pitch, 16 yellow wax, 14 tallow, and 14 sifted ashes is generally used instead of clay. The progress of the buds shows the union of the graft and stock, but it is not generally safe to remove the clay in less than three months; and the ligatures, although then loosened, are allowed to remain for some time

longer. From some kinds of fruit-trees fruit is often obtained in the second year after grafting.

Budding (q.v.) is in principle the same as grafting; and finte-grafting is a kind of budding in which a ring of bank with one or more buds is used instead of a single bud, and, a stock of similar thickness baving been cut over, a corresponding ring of bark is removed, and the foreign one substituted. This is commonly performed in spring, when the bark parts readily, and is one of the surest modes of grafting.—Inarching or grafting by approach, in which the scion is not cut off from its parent stem until it is united to the new stock, is practised chiefly in the case of some valuable shrinbs kept in pots, in which success by the ordinary methods is very doubtful.

An effect is produced by the stock on the scion which it nomishes analogous to that of a change of soil; much of the vigour of a strong healthy stock is also communicated to a scion taken even from an aged tree. There is, moreover, in some degree, an influence of the elaborated sap descending from the scion on the stock which supports it. An important part of the practical skill of the gardener or museryman consists in the selection of the proper kinds of stocks for different species and varieties of fruit trees. The stock and scion, however, must not be of species extremely dissimilar. No credit is due to the statements of ancient authors about vines grafted on fig-trees, apples on planes, &c., the semblance of which can only have been brought about by some delusive artifice; for all attempts at gratting fail except among plants of the same genus, or at least of the same natural family.

Herbaceons plants with firm stems, as dallias, are sometimes grafted. Some kinds of plants, of small size, in pots, are placed in moist hothouses or hotheds, under bell-glasses, whilst the junction of the scion and stock is going on, which in these circumstances takes place very surely and very expeditionally. But an accumulation of too much moisture under the bell-glass must be guarded

against.

Grafton, a rising town of New Sonth Wales, 350 miles NE. of Sydney, situated an both sides of the Clarence River, and 45 miles from the sea. The river is navigable, and there is considerable shipping tuade with Sydney. The rich agricultural hand in the neighbourhood yields sugar, tobacco, &c., and gold, silver, coal, and copper are also found. Pop. (1881) North Grafton, 3267; South Grafton, 638; total, 3905.

Grafton, Augustus Henry Fitzroy, Duke of, statesman, a descendant of Charles II., was born 1st October 1735, and in 1757 succeeded his grandfather, the second duke (see Charles II.). He first came to the front in political life in 1763 in the opposition to Bute, and in July 1765 he took office as Secretary of State under Rockingham, but resigned in the following May. Two months later Pitt became premier and Earl of Chatham, making Grafton First Lord of the Trensury; but in consequence of Chatham's continued illness Grafton was compelled to take upon his own shoulders the responsible duties of head of the government from September 1767. He resigned in 1770, accepted the office of Lord Privy Seal under Lord North in 1771, and filled it until November 1775. When the new Rockingham ministry was formed in March 1782 Grafton took bis old post as Lord Privy Seal, but resigned office thirteen months later. He died at Euston Hall, Suffolk, 14th March 1811. Indolent, vacillating, somewhat obstinate in his political life, and openly immoral in his private life, Grafton was the target at which Junius (q.v.) shot some of his sharpest invectives.

Gragnano, a town of Italy, 20 miles by rail SE. of Naples, with manufactures of wine and macaroni. Pop. 8611.

Graham, the name of an illustrious Scottish family of Anglo-Norman origin, who settled in Scotland during the 12th century. A Sir William de Græme received from David I. the lands of Abercom and Dalkeith, and extensive grants of estates were made to his descendants by William the Lion, Alexander II. and III., and by King Robert Bruce. One of their chicfs, Sir John de Graham of Duudaff, was the bosom friend of the patriot Wallace, and was killed at the battle of Falkirk, July 22, 1298. From the war of independence downwards the Grahams have taken a prominent part in the public, and especially in the warlike, affairs of the country. Patrick Graham of Kincardine was made a peer in 1451 under the title of Lord Graham. His grand-son was created Earl of Montrose by James IV. (1504-5), and fell with his sovereign at the battle of Flodden. The third earl twice held the office of High Treasurer of Scotland, and was appointed Lord Chancellor in 1599. On resigning that office he was appointed Viceroy of Scotland for life. His grandson, the lifth earl and first Marquis of Moutrose, is the glory of the House of Graham (see Mon-TROSE). His eldest surviving son, who was born in 1631 and died in 1699, was termed the 'Good Marquis.' He was peculiarly amiable in his disposition, and delighted in the quiet and peace of private life. The fourth marquis was appointed High Admiral of Scotland in 1705 and President of the Conneil in 1706. He was a firm supporter of the union between England and Scotland, and was created Duke of Montrose in 1707. He held the office of Keeper of the Privy Seal under Queen Anne (1709-13), was appointed Sceretary of State for Scotland by George L in 1717, and a second time Keeper of the Great Scal in Scotland. He was Chancellor of the university of Glasgow, and died in 1742. His grandson, the third dake, held in succession, undor the ministry of William Pitt, the offices of one of the Lords of tho Treasury, Paymaster of the Forces, one of the Commissioners of the Indian Board, Master of the Horse, Lard Justice-general of Scotland, President of the Board of Trade, and Joint Paymaster of the Forces. Howard of Trade, and Joint Paymaster of the Forces. He was also, like his father, Chancellar of the university of Glasgaw, and Lord-lieutenant of the counties of Stirling and Dumbarton, in which he had great influence. 'Few individuals,' says Sir Nathaniel Wraxall, 'however distinguished by birth, talents, parliamentary interest, or public services, have attained to more splendid employments, or have arrived at greater honours.' Ho died in 1836. The fourth duke was Lord Steward of the Household fourth duke was Lord Steward of the Household, Chancellor of the Duchy of Laneaster, and Post-master-general. He died in 1874. The family master-general. He died in 10/2. honours and estates were then inherited by his third honours and estates were then fifth duke. It is noteand only surviving son, the lifth duke. worthy that the title of the family is not taken from the town of Montrose, but from their hereditary estate of 'Auld Montrose,' which David Graham received from Robert Bruce in exchange for the lands of Cardross in Dumbartonshire.—The Grahams of Fintry, Duntrune, Inchbrakie, Esk, Menteith, Netherby, and Norton Conyers are minor branches of the family. See Dr James Taylord, Card With the Sec. 1987. lor's Great Historic Families of Scotland (1887).

Graham, DOUGAL, the literary bellman of Glasgow, was born in the village of Raploch, near Stirling, about 1724. He was a lunchback, and from an early age laboured irregularly as a farmservant. He followed Prince Charlie's army on its southern march to Derby, apparently as a kind of sutler, and made his way home soon after the disaster at Culloden. Five months later he had his metrical marrative ready, which, grotosque and

pitiful doggerel as it is, has no mean value as a record of the fresh observations of an honest and not unintelligent eye-witness. Soon after this he took up his abode in Glasgow, where his ready wit soon made him something of a public character, native and sometting of a purple character, but he still plied his calling as a prosperous chapman or pedlar. Here also he made himself the pactical chronicler of passing events, and wrote many of the chap-books which he sold, and which quickly became extraordinarily popular. He was appointed 'skellat' bellman (for ordinary announcements) of the city, not earlier than 1770; but there is no mention of his name in the townconneil records. He died 20th July 1779. Many of bis rambling ballads and prose chap-books were anonymons, and are now impossible to trace; of the former the best known are John Hielandman's Remarks on Glasgow and Turnimspike. His numerous prose chap-books are both lunnorous and good-humoured, but never touch the region of the literary, and are moreover disligured by a constant courseness and by occasional grossness of obscenity which admit of no extenuation.

which admit of no extennation.

The most popular were The Whole Proceedings of Jockey and Mayyy, Puddy from Cork, Lothian Ton, The History of John Cheap the Chapman, the Conical and Witty Jokes of John Falkerk the Merry Piper, Leper the Tailor, John Falkerk's Cariches, Conical History of Simple John and his Truley Misfortines, and George Buchanan, Both Scott and Motherwell meant to have edited some of Dougal Graham's work. This was finally done in a complete edition in two handsome volumes by George MacGregor (Glasgow, 1883).

Graham, Sir James Robert George, Euglish statesman, was born at Notherby, in Chuberland, Jame 1, 1792, and educated at Westminster and Queen's College, Cambridge. As private secretary to the British minister in Sicily in 1813, he had a hand in the negotiations with Marat at Naples. After his return for Carlisle as a Whig in 1826 he became a warm supporter of Catholie emancipation and a zealous advocate of the Reform Bill. Earl Grey thereupon offered him, in 1830, the post of First Lord of the Admiralty, with a seat in the cabinet. But in 1834 he seceded from the government, disagreeing with his calleagues on the appropriation clause of the Irish Church Temporalities Act; and, going over to the Conservatives, became in 1844 he issued a warrant for opening the letters of Mazzini, and caused the information thus obtained to he communicated to the Austrian minister, an act by which the ministry, and Grabam in particular, incurred great obloquy. He also encountered great displeasme north of the Tweed by his high-handed method of dealing with the Scotish Church during the troubles which ended in the Disruption and the formation of the Free Church. He gave Peel warm support in carrying the Corn Law Repeal Bill, and resigned office (1846) with his chief as soon as that measure was carried. On the death of Peel in 1850 he became leader of the Peelite party in the Lower House, and in December 1852 took office in the Coalition Ministry as First Lord of the Admiralty. He retired from official life in February 1855, and died at Netherby, October 26, 1861. See Life by Torrens (2 vols. 1863) and by Lonsdale (1868).

Graham, John, Viscourt Dunder, was the elder son of Sir William Graham of Claverhouse, in Forfarshire. His birth is placed with more likelihood in 1649 than in 1643, for he did not matriculate at St Andrews till February 1665. After three years there, then four perhaps saldiering under Turenne, in 1672 he entered the Dutch service as cornet in the Prince of Orange's horsepards. In 1674 at the battle of Seneff he saved (according to the Gramaid) William's life; in 1677

he returned to Scotland, and next year received a commission as lieutenant in a troop of horse commanded by his consin, the third Marquis of Montrose. At this time the government of Charles II. was engaged in its insune attempt to force Episcopacy upon the people of Scotland. A system of lines and military coercion was carried on of lines and mintary coereion was carried on against all nonconformists; conventicles and field-preachings were prohibited; penalties were inflicted on all who even harboured the reemants; and the nation lay at the mercy of informers. Maddened by oppression, and fired by a fieree zeal for the Covenant, the western peasantry flew to arms; but their efforts were irregular and detached and each executive failure eaths are detached, and each successive failure only aggravated their sufferings. Many were executed; the gaols were crowded with prisoners; and those who fled were outlawed, and their property confis-In this miserable service Claverhouse, now sheriff depute of Dumfriesshire, was employed. At Drunclog, on Sunday, 1st June 1679, he encoun tered an armed body of Covenanters, but was defeated, some forty of his troopers being slain, and himself forced to flee from the field. Three weeks later, at Bothwell Brig, he served as a simple captain of cavalry. These are the only affairs that can even by courtesy be called battles in which Clayerhouse was convered by Scotland. affairs that can even by courtesy be called battles in which Claverhouse was engaged in Scotland previous to James II, is abdication. They displayed no generalship. In detecting and hunting down the Covenanters he evinced the utmost activity; still, he had nothing whatever to do with the Wichester and the constraints of the constraints. the Wigtown martyrdons, and if he caused shoot John Brown, the Christian Carrier, it was after finding of arms and refusal to take the oath of abjuration. He lose to the rank of colonel, and in 1082 became sheriff of Wigtownshire, in 1683 m 1052 became sheriff of Wigtownshire, in 1683 was sworn a privy-conneillor, in 1684 got a gift of the Forfarshire estate of Dudbope, and was made constable of Dundee. That same year he married Lady Jean Cochrane, the daughter of a Whig house, who hore him one short-lived son, and who afterwards wedded the Viscount of Kilstyth. In November 1692, or his more hards syth. In November 1688, on his march up to London to stem the Revolution, Claverhouse was London to stem the Revolution, Claverhouse was raised to the pecrage as Viscount Dundee; four months later he rade with fifty troopers out of Edinhurgh, and, being joined by the Jacobite clans and three hundred Irish, raised the standard for King James against William and Mary. After various rapid movements in the north, he seized Blair Castle, the key of the Highlands, and Canard, Mackay, commanding the government General Mackay, commanding the government forces, marched against him from Edinburgh. On the evening of 27th July 1689 the two armies met at the head of the Pass of Killicerankie. Mackay's force was between 3000 and 4000; Dundee's only 2000. Two minutes decided the contest; before the wild rush of the clansmen the redcoats wavered, broke, and ran like sheep. Their loss was 2000, the victors' 900 only; but one of the 900 was Ian Dhu nan Cath (or 'Black John of the Battles'), as the Highlanders called Dundec. A musket ball struck him as he was waving on his musket-ball struck him as he was waving on his nien, and he sank from his saddle into the arms of a soldier named Johnstone. 'How goes the day?' murnured Dundee. 'Well for King James,' said Johnstone, 'but I am sorry for your lordship.' 'If it is well for him,' was the dying man's answer, 'it matters the less for me.' Wrapped in two plaids, his body was borne to Blair Castle; and in the church of Old Blair they buried him, where in 1889 the Duke of Athole placed a tablet to his memory. 'Bloody Claverse,' 'Bonnic Dundee'—the two names illustrate the opposite feelings borne towards

and Lord Macaplay have painted him, nor the 17thand Lord Macdaliny have platfield line, for the Trin-century Havelock of Aytoun, Napier, and Paget. True, Wodrow himself admits that the Hell-wicked-witted, bloodthirsty Graham of Claver-house lated to spend his time with wine and women; 'Lochiel's biographer records how he never was heard to swear, and how, 'besides family worship, performed regularly evening and morning in his house, he retired to his closet at certain hours, and employed himself in that duty.' But, then, we have Claverhouse's own admission (1679): 'In any service I have been in I never inquired farther in the laws than the orders of my superior officers'-an admission that accuses whilst excusing, and that is applicable to his whole career, Bonnie at least he was in ontward form, with the 'long dark curled locks,' and the 'melancholy haughty countenance,' which we know by his portraits and by Scott's matchless description.

The letter purporting to be written to James II. by Dundee after he had got his death-wound, and first published in Macpherson's Original Papers (1775), is abnost lished in Macpherson's Original Papers (1775), is almost certainly a forgery, though not Macpherson's. The Grameid is a long but unfinished I atin epic by James Philip of Almericelose (c. 1656-1713), one of Dundee's followers. Written in 1691, it was first edited by the Rev. A. D. Murdoch for the Scottish History Society (1888). Mark Napier's Memorials and Letters of Dundee (3 vols. 1859-62) is perhaps the worst life in the language, still well worth silting. See also Aytoun's Lays of the Scottish Cavaliers (1849); Paget's Paradoxes and Puzzles (1874); Claverhouse, by Mowbray Morris ('English Worthies' series, 1887); and Clavers, the Despot's Champion, by 'a Sonthern' (1889).

Graham, Thomas, a Scottish chemist, was born in Glasgow, 21st December 1805. Having studied at Glasgow and Edinburgh, he became in 1830 professor of Chemistry in his native city, and in 1837 he accepted the corresponding chair at University College, London. In 1855 he was appointed Master of the Mint, and resigned his professoritism. He died in London. 18th Sentender appointed Matter of the Milit, and resigned his professorship. He died in London, 16th September 1869. His name is most closely associated with the subject of the molecular diffusion of gases, his researches in connection with which led him to formulate the law 'that the diffusion rate of gases is inversely as the square root of their density.'
Amongst his important memoirs on chemistry we Amongst his important memoirs on chemistry we may mention the following: 'Absorption of Gases by Liquids;' 'Absorption of Gases;' 'Law of Diffusion of Gases;' 'Researches on the Arseniates, Phosphates, and Modifications of Phospharic Acid;' 'Motion of Gases, their Effusion and Transpiration;' 'Diffusion of Liquids;' 'Liquid Diffusion applied to Analysis;' 'Liquid Transpiration in Relation to Chemical Composition;' and 'Molecular Mobility of Gases,' These were contributed to various scientific journals, and were collected in 1876. His excellent Elements of Chemistry appeared in 1837. See Life and Works of Graham, by Dr R. Angus Smith (Glasgow, 1884).

Graham, Thomas. See Lynedoch (Lord).

Grahame, James, anthor of The Sabbath, was born at Glasgow, April 22, 1765. The son of a prosperons lawyer, he went in 1784 to Edinburgh to study law, and, after qualifying as a writer to the Signet, was admitted as an advocate in 1795. Finding law uncongenial, at forty-four he took orders, and was successively curate of Shipton in Gloucestershire and of Sedgefield in the county of church of Old Blair they buried him, where in 1889 the Duke of Athole placed a tablet to his memory.

'Bloody Claverse,' 'Bonnic Dundee'—the two names illustrate the opposite feelings borne towards one whom the malice of foes and the favour of friends have invested with a factitious interest. He was neither the devil incarnate that legend | Globel Factor of Sedgefield in the county of Durham. Ill-health compelled him to return to Scotland, where soon after he died, September 14, 1811. Grahame's pootical works include Mary, Queen of Scots, a dramatic poem (1801); The Substant (1804); British Georgies (1804); The Birds of Scotland (1806); and Poems on the Abolition of the Slave-trade (1810). His fame rests securely on his

blank-verse poem, The Sabbath. It falls far short of Cowpor's vigour, variety, and real genius, but in its tender devotional feeling and occasional felicity in describing quiet Scottish scenery it is not unworthy of that master, whom he resombled further in the retiring amiability of his character.

Graham's Land, an island of the Antaretic Ocean, discovered by Biscoc in 1832, lies between 65° and 67° S. lat. In front, towards the north, are a number of islets, called Biscoe's Chain.

Grahamstown, the capital of the eastern prothe maritime division of Albany, 1728 foot above sea-level. By rail it is 106 miles NE of Port Elizabeth, and 43 NW, of Port Alfred. It is the seat of two bishops-Anglican and Roman Catholie; and in its Anglican eathedral is a monument to Colonel Graham, after whom the city is named. Leather is manufactured, and among the institutions of the place are its museum, St Andrew's College, a public library, a general hospital, and large barracks. Pop. (1875) 6903; (1889) 10,000 (7000 white, and 3000 coloured natives).

Grahamstown, New Zealand. Seo Thames. Graian Alps. See Alis.

Grail, LEGEND OF THE HOLY (ctymology unitain). The spelling varies considerably in the certain). oldest texts from graat to grauts. A vessel of some kind is obviously intended, and derivation has been suggested from the Low Lat. gradulis or gradulus ('a shallow vessel'), which appears also leads to the state of the state in the forms grasale, grassale, grazala, and Old Fr. grasals or grazuls. See Ducange-Favre, Gloss, Med. et Inf. Lat., under 'Grasala.' This etymology is supported by the testimony of Helinandus (c. 1204), 'gradalis dicitur gallice scutella lata et aliquantunun profunda, in qua dapes scient appeni, et dieinr nomine graal. Diez, Etymol. Worterbuch, 601, suggests a lest cratalis from cratus, the Low Latin form of crater, as the original of the above-cited forms. Other etymologies have been suggested, but all are worthless.

Chronological Arrangement of the Grail Romances.—(a) Chrestien's portion of the Coute du Graal, circa 1190; (b) Gautier de Doulens' condu Graal, circa 1190; (b) Gauter de Doulens continuation of same, circa 1195 in one form, with expansions circa 1200; (c) Robert de Borron's poem, 1200-10; (d) Queste del Saint Graal, about the same date; (c) Grand St Graal, only known in a redaction of circa 1230-50, but extant in a less extended form prior to 1204; (f) Wolfram von Eschenbach's Parzival, circa 1210; (g, h) continuation of Conte du Graal by Manessier and Gerbert, circa 1200-30 (d) the press Parzeval la Gallois circa 1220-30; (i) the prose Perceval le Gallois, circa 1225; (k) prose continuation of Robert de Bor-50; (1) Heinrich von dem Türlin's Diu Krone, prior to 1250. Personages and part of the subjectmatter of the Grail romaness also appear in (m) the Malinogi of Peredur all Evraw and (n) the alliterative metrical remance Sir Perceval. Both alliterative metrical romance Sir Perceval. these last are in 14th-15th century MSS., but are certainly older, though posterior in their present form to Chrestien, whom both have used.

Subject-matter of the Romances.-The logend consists of two portions: a Quest relating (1) Perceval comes to the eastle of the Fisher King, sees the Grail, fails to ask concerning it, is reproved, has to wander many years, comes a second and third time to Grail Castle, makes whole a broken sword or slays the enemy of the Fisher King, hat the latter as his nophew, and succeeds him in his kingship (a, b, f, g, h), or releases him at once from supernaturally prolonged life (h) or from the enchantment of death in life (l) (the same incidents as in a, f, g, h reappear in part in m, but the Grail is replaced by a head in a dish); (2)

how Galahad, Perceval, and Bors alone of Arthur's knights succeed in beholding the Grail, follow it to the east, where Galahad and Perceval die, but Bors returns to Arthur's court (d, e)—and an Early History relating how the Grail was given by Christ to Joseph of Arimathea (c, d, e, g, h, k), and how it to Joseph of Arimatica (c, d, e, g, h, k), and how it came to England either in the charge of Brons, Joseph's brother-in-law (e, k), or of Josephe, Joseph's son (d, e). In all these versions the Grail is a cup or vessel, and in the Early History forms it is the cup used first by Christ at the Last Supper, secondly by Joseph to collect the blood which flowed from Christ's wounds as he hung upon, or after his body was descended from, the cross. In (f, W) of from an entirely different account is found. f) Wolfram an entirely different account is found: the Grail is a precions stone, fallen from heavon, and given in charge to Titurel and his dynasty the Grail kings.

Nature and Properties of the Grail. - In the Quest remances, the oldest portion of the cycle, and notably in the Conte du Graal, the Grail is simply a miraculous food-producing vessel. With a broken sword which only the destined hero can make whole, and a lance which drops blood, it is simply one of three talismans, and its importance in the conduct of the story is not greater than theirs. The Christianisation of the legend brought about a profound change in the conception of the Grail. This change is only fully manifest in Robert de Borron, where the properties of the Grail are exclusively spiritual; to the former as full and sweet solace as their heart could long for. In the other Early History forms, and in those later Quest versions which have been affected by the Early History, the Grail have been affected by the Early History, the Grail retains its material side by side with its spiritual properties, even where, as in the case of d, e, and h, these versions are written in a mystical and theological spirit. From (d) Queste we learn that the Grail strikes with dumbness those to whom it appears. In Wolfram (f) the spirit is likewise mystical and theological, but of course the sacramental nature of the Grail, so prominent in those romances which identify it with the Last Supper cup, is wanting, hence the symbolism is on different lines. Here too, however, the material properties of the Grail are as strongly insisted upon as the spiritual ones.

Hypothetical Development of the Legend.—The Grail is originally a portion of the goar of old Celtic divinities, more especially of the god of the nuderworld, whose name among the Cynny was part. Bran. Numerous Celtic sagas, as well as existing Celtic folk-tales, tell of a here who journeys to the land of shades and brings back talismans, prominent amongst them the inexhanstible vessel of plenty and rejuvenation. At an early period this tale got mixed up with a Peredur sage, in which the hero, to avenge a kinsman, had to seek for a magic lance and sword. The result of the fusion may be traced in the forms which underlie the Mabinogi of Sir Percevul. Percedur thus came in contact with Bran, lord of the under-world, who was identified with Bran the Blossed, whom later Welsh tradition made the here of a conversion of Britain story. This Bran is the Brons of the Joseph of Arimathea legend, and by this means the old Celtic heathen vessel of increase and youth came into connection with the follower of Christ, who was at an early date a favourite legendary figure on British soil, the Evangelium Nicodemi which relates his legend having been widely known there at a time when continental literature is altogether silent regarding it. The Christianisation of the Celtic saga had probably begun before Chrestien, though only to a very slight extent. It was fully carried out by men who wrote after, and in opposition to him, and who wished to make the story a vehicle for moral and religious teaching. Robert de Borron alone worked out the conception in a fairly consistent way; in the other theological romance-writers—e.g. the authors of the Queste, of the Grand St Graal, and Gerbert—the Graal is at least as much heathen as Christian. In these romances the tendency is rather moral than dogmatic; they are in the main glorilications of asceticism, and in especial of physical chastity. This latter idea, almost foreign to the earlier works of the cycle, is most fully worked out in the Queste was one of the romances used by Malory in his Morte Darthur; hence the Galahad story has had a great and abiding influence upon English literature through Tennyson and others. Wolfram von Eschenbach, like Robert de Borron and the anthor of the Queste, received the story from Chrestien, and, like them, was disastisfied with the latter's treatment of it. He, however, has worked out a religious and ethical ideal of a far nobler and truer kind than that found in the Queste. His conception is based, not upon chastity, but upon charity, and the Grail becomes with him a symbol, not of ascetic longing and its unearthly reward, but of human striving and human love in their noblest manifestation.

Evidence in support of the foregoing contentions, together with full summaries of the romances themselves, and bibliography and analysis of the investigations of previous students, will be found in the writer's Studies on the Legend of the Holy Grail, with especial Reference to the Hypothesis of its Coltic Origin (Lond, 1888). Compare also M. Gaston Paris's admirable general account of the Arthurian cycle, Histoire Lettiraire de la France, vol. xxx. (Paris, 1888); and for a discussion of alleged Buddhist influence upon the Grail legend, the writer's article in the Archwological Review, June 1889.

Graile. See GRADUAL.

Grain. For grain imports and exports, see FOOD, Vol. IV. p. 720; also the articles WHEAT, &c.

Grain, as a unit of weight, is supposed to be the average weight of a seed or well-ripened car of wheat; of such grains 7000 are held to be a pound avoirdupois. The grain is also the 20th part of a scruple in apotheearies' weight, and the 24th part of a pennyweight troy. See also Gramme.

Grain Coast. See Guinea.

Graining, a kind of dace found in the Mersey and some few English rivers, and in Swiss lakes, distinguished by Pennant and Yarrell as a separate species (Leuciscus lancastriensis), but regarded by Günther as only a local variety of the dace (L. vulgaris). See Dace.

Grains of Paradise, or Maleguetta Pepper, an aromatic and extremely hot and pungent seed imported from Gninea. It is the produce of Amonum Grana Paradisi, a plant of the order Zingiberaceae. By the natives these seeds are used as a spice or condinent; in Europe ebiefly in veterinary practice, and fraudulently to increase the pungency of fermented and spiritnons liquors. By 56 (teo. III. chap. 58, brewers and dealers in beer in England were prohibited, under a heavy penalty, from even having grains of paradise in their possession. This drug is much used to give apparent strength to bad gin. The name Malegnetta Pepper, or Guinea Pepper (q.v.), is also given to other pungent seeds from the west of Africa.

Grakle, the common name of many birds of the Starling family (Sturnidæ), all tropical or subtropical. They have very much the habits of starlings, which some of them even excel in their initative powers, and particularly in the imitation of lumum speech. This is remarkably the case with the Mina Birds or Hills Mynas (Graeula jarana), common in India, which are easily tamed and taught. Many grakles feed on seeds and fruits, while others are useful as destroyers of insects. See STARLING.—In the United States the name Grakle or Grackle is applied to several species of the genera Scolecophagus and Quiscalus, omnivorous birds, also called 'blackbirds' and 'boat-tails.'

345

Gralle, or Grallatores (Lat., 'stilt-walkers'), an old order of wading and running birds, including rails (Rallidee), snipes and emlews (Scolopacidee), plovers (Charadridee), linstands (Otididee), cranes (Gruddee), lerons and bitterns (Ardeidee), storks (Ciconiidee), and numerons other families. These are grouped by modern unithologists in a number of smaller orders, while the old order Grallie is aliandoned as too hopelessly large. They are mostly long-legged marsh or coast birds, generally with long legs and bills. Their distribution is very wide, the four largest families (rails, snipes, plovers, and herons) being quite cosmopolitan.

Gram. Seo CHICK PEA.

Gramineae. See Grasses.

Grammar deals with the usage of some one form of speech. It may be described as a section of the larger science of language (see article Phillology), which theats of the origin, development, and general character of the principal families of language and of human speech as a whole. In common use, however, grammar means not a branch of science, but a treatise on some one well-defined form of speech as used in the present day, as by French grammar we mean a book on the usage of Paris; by English grammar we mean an account of the language spoken and written by educated men throughout Great Britain, which language, however, is only one dialect of English speech, the East Midland. That dialect by favouring conditions has superseded the other dialects, southern and northern, which were once spoken and written, and are still in a lessening degree spoken, in different parts of the island.

Grammar has two parts. The first describes the forms of a language, the single words which occur in it, its nouns, verbs, &c.; and its modifications of such forms, the cases of its nouns, the persons and tenses of its verbs, &c., used to express modifications of the same idea, as 'child,' 'child's,' 'children,' 'spring,' 'sprang,' 'sprang,' in English. This is called the morphology of a language, or (more loosely) its etymology. The second part deals with the use of these forms in combination: their syntax—i.e. their arrangement in order of speech. The general principles of this will vary little in the different languages of the same family; but each language has its idioms, as we call them, its own special refinements of usage, and it is in the clear discrimination of these that the practical value of a grammar lies.

Grammar in this function may be called special. It does not enter into the bistory of the forms which it describes; it is sufficient if it sets forth what they are at a particular time, without showing how they became such. But it is possible to a considerable extent to trace the history of these forms—c.g. we can see how literary English has developed out of the English of Chaucer, and that from the English of an earlier day, how the forms have changed mostly in the direction of uniformity, and how (to a lesser degree) their syntax has altered. To trace this belongs to historical grammar, and some of the results of this science are now commonly given in

each special grammar. Lastly we can compare together the forms and usage of engrate dialects. We can compare, e.g., the grammar of our literary English dialect and that of the speech of Dorset, as set forth by Mr Barnes; and, employing the results of historical grammar, we can trace back the varying development of English speech as a whole; or we can compare the development and trace the connection of English and of German speech, and the relation of each of these to Latin or to Greek, till we arrive at some knowledge of a common speech of which all these are only derived forms. This is the work of comparative

grammar.

Naturally, we do not learn our own speech from a written grammar. A child learns his words and their use from those around him, not as a whole, but one by one; and he forms new words for himself on the analogy of those he has already acquired. Whon he finds that any of these formations are not used by others he rejects them, and so he assimilates his speech to that of those around him. It is when we have to deal with a speech which is not our own, either that of a foreign nation, or of our own language at some earlier period, or of some dialect of our own language, that we need a grammar. The earliest works on grammar were due to the second of these causes. At Alexandria, the great commercial and literary centre of Greece in the days when the separate Greek states had ceased to be autonomous, there was for the first time a lunge collection of the works of earlier writors, especially the Homeric poems. The age was one destitute of original ability; the loss of freedom had caused the loss of the motives which had produced the literature of the past. But it contained a large number of literary men, whose activity was chiefly spent on the work of their predecessors. This was to them in language and in style archaio; it required glosses—as we should say, glossaries—and explauations of disused forms. Hence arose the first grammarians, men often of conspicuous ability in their own line, such as Zenodotus and Aristarchus. At a later time, Romans who wished to learn Greek had grammars based upon Greek models, compiled for them in Latin, and these have been the parents of all European grammars to the present day. The grammatical terms with which we are familiar are consequently in the main Latin translations of Greek originals, and because of this they are often

It is to the Greeks that we owe the number of the so-called 'parts of speech.' But their eight were not the same as ours. They had (1) the noun; (2) the verb (terms which go back to Aristotle, though in his use the 'verb' meant all that is logically called the predicate); (3) the participle, so called because it partook of the nature of both the noun and the verb—it was a noun in form, yet it governed a case like a verb; (4) the article; (5) the pronoun; (6) the preposition, so called not as being placed before a case, but as set before a verb or noun in composition; (7) the adverb—i.c. the 'additional predication,' not anything specially belonging to the verb, as the Latin name seems to imply; (8) the conjunction. The Romans modified this list. First, they rejected the participle, and supplied its place by dividing the noun into the substantive and the adjective; this is a gain to logic, lust as a matter of history the two go back to the same origin. The thing and the quality of the thing were alike expressed by the noun, and the analogic feeling in man suggested that they should be represented when together by nouns of the same class—i.e. with the same terminations: hence we have the grammatical property called gender, which is alto-

gether independent of natural gender. Secondly, they rejected the article in their grammar, not having it in their speech. Here they were listorically right, for the Greek article was only a pronoun. Later Latin developed a new one out of a different pronoun, ille, seen in various forms in the different Romanee languages—French, Italian, Spanish, &c. But having lost the article they felt bound to fill up its place: therefore they put in the interjection, which is the conventional stereotyped expression of the natural cries which, we may believe, in days before articulate speech existed, eked out the earliest and simplest means of communication—i.e. gestures (see article Philology). The interjection is therefore no 'part of speech;' it is an imperfect undeveloped 'speechwhole;' and the Greeks rightly did not include it in their list.

If we exclude the interjection, we can prove by means of historical grammar that these different parts of speech run back to two, the noun and the verb; and the distinction even of these rests on the inability of our analysis to separate them completely. It is true that nonns are distinguished by 'case-sullives'—Lupus, Lupun, Lupu, Lupu, Lupu, case in Latin; and the verb by 'personal suffixes'—amo, amus, amus, amat, &c.; but there was doubtless a time in our parent-speech when no such 'suffixes' existed, and all that lies behind them may have been in those earlier days identical for noun and verb. Our own language shows the possibility of using one form—c.g. 'love,' alike for noun and verb. The pronoun differs from the noun in meaning by its greater generality. 'This' includes all objects in our immediate neighbourhood, books, chairs, tables, &c.; 'he' includes all 'Johns,' 'Smiths,' &c. In form it differs only by the simpler and on the whole the more archaic character of its root or ultimate element. The term 'pronoun' expresses only one subordinate use—the anaphoric or 'reference' use, by virtue of which, having once uttered a man's differentiating name, 'John,' or the like, we refer to him afterwards, so long as clearness permits, only as 'he.' The origin of adverbs and prepositions out of nouns or pronouns is very obvious in our own language; 'once' is Old Eng. ānes, the genitive of ān ('one'); 'seldom' is an old dative plural of seld ('rare'); to go 'afoot' was to go 'on' foot; 'beside' is 'by side (of);' and, if we are mable to reach the original form of prepositions like 'on' and 'by,' we do not doubt that in days beyond our analysis they were nouns modifying other words which then filled the place of the nouns and verbs of later times. Similarly, conjunctions are either noun-cases or condensed sentences; 'whiles-t' is 'whiles,' the genitive of 'while' (time), with a final t, which may be analogons to that of 'lest' (anothor conjunction), originally 'thi less the,' then 'lesthe,' and 'leste;' howbeit,' b

may he traced back to not more than two.

All language at all times of which we have any knowledge, and doubtless from the very beginning of human speech, is a modification of existing combinations of sound. Language probably began, as has been already suggested, with the use of cries to help out gestures. These cries were associated by use with particular ideas, and that most elementary language (or languages, for there is no need to suppose that language sprang up in one place only, the circumstances being everywhere similar) was subject to the same laws which mould our speech at the present day. Groups of sound expressing the required thought are combined together, as 'man' and 'kind,' or 'house' and 'top.' The combination may be such that the different parts are always separable; then each

sound-group (or word, as we may now call it) remains intact, and the relation which one word bears to another in the expression of the entire thought depends on the position of the words, the stress, or the pitch of the voice with which each is pronounced, or other more minute conditions. A language of which this is the prevailing character is called 'isolating,' and Chinese is the hest-known type. It seems inadequate, yet the facility with which ideas can be expressed in such a language may be seen from the different grammatical values which the same sound-group can have in our own language in phrases like 'love is sweet,' 'we feel love,' 'God is love,' 'I love yon,' &c.

But nearly all languages admit of combination more complete than this, wherehy two or more words can be joined together, so that a single sound-complex expresses two or more ideas in combination—e.g. 'free-man,' 'black-bird,' 'tbank-ful,' 'high-born,' 'back-birle,' 'ill-treat,' &c. Each of these may form the model for numerons copies; thus, 'thankful' can produce 'youthful,' 'health-ful,' which are later English compounds. Then came hybrid compounds, where the first member is of Latin origin (of course through the Norman), as 'mereiful,' 'masterful.' In this last we see that the exact nature of the original compound is obscured, and that 'ful' gives merely the additional sense of 'like,' as though the compound had been 'masterlike,' which does indeed occur in a briefer form, and with a secondary sense, as 'masterly.' This example throws light on the bistomy at all word formation. history of all word-formation. A word may cease to be felt as a compound commonly through change of form in one or both of its parts, as 'masterly,' where the idea of the skill of a master in some art alone remains; or 'lussy' (house wife), where both parts of the compound are lost. Sometimes only one syllable may remain, as in 'lord' (loafward). Often some great change of idea joins with phonetic change in obscuring the nature of a compound as in fortnight (fourteen wight). Now when pound, as in fortnight (fourteen-night). Now, when the last part of the compound fulfils certain conditions, it may be used in the formation of countless other words: -lie (like), which is found in O. E. in 'corth·lic,' 'cyne-lie' (earthly, kingly), passes on in its simpler form -ly in 'daily,' 'princely,' &c.; and -ly is then what grammarians call a suffix, an element which cannot be used alone, but can be added on at pleasure to another word to modify its meaning. The conditions are (1) that the form its meaning. The conditions are (1) that the form of the so-called sullix must be a convenient one phonetically; (2) that it must have been in use in a considerable number of compounds at the same time: for 'bridegroom' (bride-man), 'nightingale' (nihte-gate, night-singer), 'gossip' (God-sib, God-related) have produced no analogous forms in English owing to the rarity of the use of their second member; (3) that the last member must be general in its sense, or at least acquire some general general in its sense, or at least acquire some general sense in composition. A suffix is especially favoured which can be mentally referred to some common world for the sense in composition. which can be mentally referred to some common word of general sense, though it may really have nothing to do with that word. Thus, in 'credible,' 'invincible,' &c. the original suffix -ble (-bili in Latin) is seen; but in many words which come to us through the French, 'probable,' amiable,' a preceded the last syllable: thus these words seemed to mean 'able' to be proved, or to be loved; and so words like 'knowable,' 'lovable,' 'reliable' sprang up in abundance. Independently of these conditions of the origin of suffixes, it is also necessary that the first member of a commond remain unobscured. Thus, no words have been formed on the model of 'orchard' (wort-yard), though ard as a Norman-French suffix has produced derivatives like 'drunkard,' on the analogy of 'bastard,' 'wizard.

We are justified in inferring from the English sulfixes which can be explained as remnants of words (*ful*, -ly*, -dom*, -hood*, and the like) that the others whose history can no longer be traced had a similar origin; and even in extending this principle to those formative suffixes which reach back to the earliest period of language. It is a sound axiom that what is in language has been and will be; it is only by dealing with spoken languages that we can infer the nature of those known to us by tradition only. It cannot be said with certainty that we should assign the same origin to those other suffixes—which we call inflectional—to which we owe the cases of our nouns, and the persons, indeed, of the verbs were, it is most probable, prononns. The m in 'am' represents original '1,' so 'am' meant 'exist I,' and was a compound of two words, originally as separate as '1 exist;' s represented 'thou,' and t (Eng. th in 'loveth,' &c.) was 'he.' But we cannot say exactly what the tensesuffixes were, though we believe they are the remnants of words; nor what were the case-suffixes of the nonns—what, for example, was the s which still marks our genitive case, or the s of our plurals. But we know that we can make a 'noun of multitude' by making such a compound as 'man-kind,' and there is no reason why -es (the original form of -s, our plural suffix) may not once have been some such word as 'kind,' and compounded in the same manner. Such a history is in accordance with all we know of the processes of language.

It will be apparent from what has been said that there never was in any language some one period in which its suffixes were made, succeeded by a period in which there was no more growth but only decay. Formation is always going on, though more slowly in languages which are stereotyped by literature. In English we have almost ecased to use our second personal suffix -st, in 'lovest,' &c. But that st is itself an English growth: the older English form was s: in the old Mercian Psalter (edited by Mr Sweet in his Oldest English Texts) we find both 'thu dydes' and 'thu dydest,' 'thu his' and 'thu bist,' &c. Other Tentonic languages show the same (independent) development. Still more do 'formative suffixes' go on growing. One of our commoner English suffixes (used to make a diministive) is -let, seen in comparatively leeent words, like 'brooklet,' 'streamlet,' &c. But the form is really a development of the older -et (the French -ette) in 'helmet,' 'bamcret,' 'eygnet.' Several of these forms, like 'islet,' circlet,' and 'eaglet,' were formed out of nouns which ended in l, and so new ones were formed—'ring-let,' &c., as though the l had always belonged to the suffix. We are getting a new suffix in -nist, seen in 'tobacconist,' &c. This is an extension of the old suffix (Greek, through Latin into French) -ist, in 'jurist,' 'dentist,' &c.; this seems to be due to words where the n belongs to the root-part, as 'mechan-ist,' 'pian-ist,' and other late forms.

A common method of inflection in language is, not by suffix, but by change of the original vowel: thus, we have 'man,' but plural 'men;' and in verbs we find present 'drink,' preterito 'drank,' past participle 'drunken.' These can, however, be traced to the influence in different ways of lost suffixes. Thus, the old declension of 'man' was nom. 'mann;' gen. 'mannes;' dat. 'menn(i);' plur. nom. 'menu(i);' gen. 'manna; 'dat. 'mannum.' It is clear that the change of a to e had at first nothing to do with the plural, for it is found in singular and plural alike when i followed: this yowel had the property of modifying a in a preceding syllable to e. But when the cases were lost, as happened in English mainly through Norman

influence, 'man' remained as the only singular form, and 'men' as the only plural; so, for grammatical purposes, the plural might truly be said to be made by changing a to c. Similar is the history of 'mouse,' plur. 'mice;' 'goose,' plur. 'geese,' &c. The verb-change, i, a, u, has a most grammatical back and some actional it must symmetrical look, and seems as though it must have been devised to express the change of relation, As a fact, however, in this and all similar eases, i and a represent in all Germanic languages original e and e; and these two rowels probably represent developments of a minute variation in pitch-accent (e being higher than e), dating from beyond the historic period of the parent-speech; and this variation maks indeed tense distinctions and this variation maks indeed tense distinctions—e.g. in Greek, pres. dérkomai, perf. dédorku; but it is also found in uonns such as génes, genos, and it seems to have had nothing to do with tenses at first. The second change, that in 'drank,' 'drunken,' has quite a different origin, but one equally removed from tense-formation. Like the first variation, it represents a very ancient change—due to the fact that in the paramet change of the syllables immediately presents. ancient change—due to the fact that in the parent language the syllables immediately preceding or following that which bore the stress-accent were weakened: no language shows better than English how to slur a syllable immediately preceding or following a stressed one—e.g. in 'alone' (where the last syllable is stressed) the a, originally the full a of 'all,' is sounded like the a of 'bnt,' or the o of 'son;' the same sound is commonly heard—e.g. in such a word as 'liberty,' instead of the a of the middle syllable, the stress being on the first. Now in the past participle the stress was on the suffix—no (seen as—a in 'drunken'), and hence the vowel-change in the root. But it oddly happens that just the same change took place in the plural of the perfect itself, owing to the plural personal suffixes being stressed in the parent language; and so the Old English singular third person was 'drank,' but the third plural was 'druneon' (a precisely parallel case is the Creek sing. odds, plur. ldmen, orig. idmén). So (treek sing. oida, plur. idmen, orig. idmen). So there was a time when it was right to say 'I drank' and 'we drank;' but a meaningless distinction like this could not be maintained; one tinction like this could not be maintained; one form was bound to supplant the other, and 'drank' won; but 'won,' the plur, of 'winnan,' supplanted the sing, 'wann;' 'string' beat 'string;' 'sprang' and 'spring' were used indifferently at the beginning of this century, as by Scott and Byron, to help their rhymes; and here and in other verbs there is still some fluctuation of use, even among educated men. These examples may suffice to show that vowel-change, though extremely useful to mark grammatical distinctions, was not in anyway designed for this end, which has been reached way designed for this end, which has been reached by unconscious differentiation: for we may infer from what we can observe in languages whose history can be traced that the prehistoric distinctions in the earliest recorded languages had a like accidental origin.

The history of grammatical forms may then be roughly sketched thus. They arose probably always from composition. Such compounds were subject to phonetic corruption, and the unstressed syllables were slurred and lost their individuality; or one member of the compound ceased to be used independently, some other word having superseded it, the result being the same as in the first case—viz. the loss of special significance in one part of the compound; and when the part so generalised is the final syllable, that syllable becomes a mere suffix, and can express rolation, as the -ty in 'fatherly,' or the -s in 'fathers.' Furthermore, the cases of the nouns and the persons of the verbs thus formed were liable to variations of form in the same noun or verb, due to the incidence of !

stress or the influence of one syllable on another. The irregularities thus produced were again levelled in process of time by the natural tendency to do away with differences which are no longer significant; hence came symmetry of inflection, which is not the earliest stage in grammar, but rather the result of long unconscious play of physical and mental forces. Again, inflections constantly perished, either by simple phonetic decay, or more commonly through change of nationality, as, for example, when the Tentonic and other races adopted the Latin of the conquered Raman provinces, or when the descendants of the Normans began to use the national speech of England. Thus arises much simplification of what is to the speakers a foreign grammar; also there is a great growth of hybrid forms, Norman-French words combining with English suffixes, and vice cersal. With the dying out of inflections arises a great growth of indeclinable words—adverbs, conjunctions, and prepositions: some cases, as the locative or the ablative in Greek, or the instrumental in Latin, became almost extinct; the few surviving forms, as Greek locatives in -ci and ablashryving forms, as creek locatives in -6s, belonging to nouns of the o class, lost their connection with those nonns; they remained isolated forms, freed from the levelling tendencies which affected the other cases of the same noun, because no longer felt to be in connection with them. Thus they could become the origin cach of a connection of the conne the transfer of the transfer o through some accidental break of connection. through some accidental break of connection. In English our one surviving case-form in the gonitive is -s, yet this very form has been the panent of namerons adverbs: 'ānes' (already mentioned) was the genitive of 'ān' (one): the connection was lost, and the adverh 'onee' arose, and produced 'twice' (older form 'twi-es'), 'thrice' by more analogy, no such genitives having ever existed; so, tod, 'forward-s,' 'alway-s,' and many others are analogical forms—no true genitives, but copies of the model set by an isolated genitive. It has been well said by one of the greatest of It has been well said by one of the greatest of modern German philologists, Professor II. Paul, that isolation is the essential condition of all speech-development.

speech-development.

Lastly, even while cases survive in use, it is necessary to supplement them by prepositions, because (except perhaps in languages which, like the Finnish, have fifteen cases) there are not enough case-forms to express the numerons relations in space ('to,' 'from,' 'in,' 'upon,' 'by,' 'near,' 'with,' &c.) in which one person or thing may stand to another. As eases die out this need increases, and modern European languages express practically all relations by prepositions. This valuations are constituted in security and the samples are constituted. practically all relations by prepositions. This principle is sometimes called analysis, as contrasted with the combinatory 'synthetic' principle of older forms of languages. Naturally no language is ever completely analytic: even in English words like 'father's' and 'lovo's' still attest that the language was once synthetic.

Those who desire fuller insight into the principles of grammax (as seen in languages of the Indo-European type) may consult the well-known works of Prof. Max Müller; A. H. Sayce's Principles of Computative Philotopy, and his Introduction to the Science of Language, which treat the subject from a different standpoint; W. D. Whitney's Life and Growth of Language, and his Linguistic Studies: H. Paul's Principien der Sprachgeschichte, an invaluable but difficult work, translated, though not made materially easier, by Prof. Strong. A. though not made materially easier, by Prof. Strong. A synoptic view of the relation of the Indo-European languages will be found in the still unfinished (Frundriss der veryleichenden Grammatik of Karl Brugmann (vol. i.

tians. by Wright). Excellent works on special languages are Whitney's Sanskrit Grammar and Delbruck's Allindische Syntax; for Greek, may be mentioned (out of many) Brugmann's Grammar in J. Müller's Handbuch der Massischen Altertumsnussenschaft, and D. B. Monro's Homeric Grammar—a most suggestive book; for Latin, Stolz's Grammar (also in Muller's Handbuch), and Drigger's Historical Latin Syntax, which, though old, is still the most systematic work on the subject; mnumerable valuable articles hearing on both Greek and Latin are to be found in Kuhn's Zeitschrift, Bezzenberger's Beiträge, the Mimoires de la Société de Linquistique, the Cambridge and the American Journals of Philology; for Keltic, the Grammars of Zeuss and Windisch (Old Irish, trans. by Dr. N. Moore), and Prof. Rhys's Lectures on Welsh Philology; for the Romance languages colectively, the Grammar of Diez and the (still unfinished) Grundriss der romanischen Philologie of G. Gröber; special works on these languages are too numerous to mention. For Teutonic languages there is an excellent series of grammars published by Niemeyer (Halle), on Icelandic by Noreen, on Old High German by Brame, and on Middle High German by Paul (Strong and K. Meyer's History of the German by Paul (Strong and K. Meyer's History of the German by Paul (Strong and K. Meyer's History of the German by Paul (Strong and K. Meyer's History of the German by Paul (Strong and K. Meyer's History of the Gibier, Grammar of Old English are the best; Prof. Skeat's Principles of English Etymology should also be consulted; Storm's Englische Philotogie is excellent, but still a fragment; A. J. Ellis' Early English Pronunciation (5 vols. 1860 80) is a mino of information on the history of the English language.

Grammar-schools. See EDUCATION.

Gramme is the standard mit of French measures of weight, and is the weight of a cubic centimètre of distilled water at 0° Centigrade (corresponding to 32° F.); the other weights have received names corresponding to the number of grammes they contain, or the number of times they are contained in a gramme (see December System, Metric System). A gramme = 15 48248 grains troy, from which the equivalents in English measure for the other weights can easily be found; thus:

	Giains Troy.		Lb. Avoltdupola,		ıla.
Centigramme =	15 13234	=	.0000220	162	
Decigramme =	1'543234	=	·000220 t	62	
GRAMME ==	15,43234	=	.0022040	2	
Decagramme =	151.3231	=	0220463		
Hectogramme =	1543.234	=	220102		
Kilogramme =	15432:31	=	2.20402		
Myriagramine =	15432314	=	22.0162	==	'19081 cwt,
Quintal $(q.v.) = 1$		=	220.462	=	1.9634 "

Gramme-atom. —A quantity of an elementary substance, such that the number of grammes-weight is the same as the atomic number of the element—e.g. 12 grammes of earhon (C=12).

Gramme-Equivalent.—A number of grammes-weight of a substance, elementary or compound, equal numerically to the quantity of that substance which is chemically equivalent to unit weight of hydrogen—e.g. 8 grammes of oxygen, 9 grammes of water.

GRAMME-MOLECULE.—A quantity of a substance, elementary or compound, such that the number of grammes and the molecular weight are numerically the same—e.g. 32 grammes of oxygen (O_2 =32), 18 grammes of water (H_2O =18).

Granmiche'le, a town of Sicily, 33 miles SW. of Catania, on a mountain-ridge, 1768 feet above scalevel. Beautiful marbles are produced in the neighbourhood. It was founded in 1693 in place of the neighbouring town of Ochiola, which had been destroyed by an earthquake. Pop. 11,804.

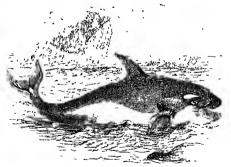
Grammont (Fr.; Belg, Geeraerdsbergen), a small town in the Belgian province of East Flanders, on the Dender, 14 miles by rail S. by E. of Ghent, with an episcopal seminary, and famous manufactures of black lace. Pop. 9836.

Gramont, or Grammont, Philibert, Comte DE, a celebrated French courtier, was born in 1621.

His grandfather was husband to 'la belle Coriswhile still very young he distinguished himself as a volunteer under Conde and Turenne, and as a volunteer under Could and Turenne, and quickly became a favourite at the court of Louis XIV., from his handsome figure, lively wit, and wonderful luck at play. But his gallantries brought him exile from France in 1662. He found a pleasant refuge and congenial society among the merry profligates that througed the court of Charles II. of England. Here he took his share in all the intringers that formed the subspection of those intrigues that formed the sole occupation of those gilded reprobates of both sexes who modelled their morals on the king's. He married, but not without compulsion, Eliza Hamilton, sister of Anthony, Count Hamilton, with whom he afterwards returned to France, there to live as he had lived in England. Ninon de l'Enclos said he was the only old man who could affect the follies of youth without being ridiculous. At eighty he inspired his own memoirs, or at least revised them when written by his brother-in-law, Anthony Hamilton (1646-1720). This strange book is a remarkable revelation of a world of intrigue and villainy, saved from detestation only by its brilliancy and wit. It is written with equal grace and vigour, and its portraits are among the lest materials for the domestic history of the time. Gramont survived till 1707. His Minoires was first printed auonymously in 1713, and an English translation by Boyer was published in 1714. The work, though actually the composition of a foreigner, is an acknowledged Freueliclassic, and has often been reprinted, sometimes in forms as sumptuous as the editions by Renouard (1812) and Gustave Brunet (1859). The best English editions are Edwards's (1793), Malleville's (1811), Bohn's (1846), and that published by John C. Nimmo in 1889.

Grampians, a name very loosely applied to the mountain-system of the Scottish Highlands. Some, for instance, restrict it to a 'chain' of heights bordening the Lowland plain from Dumbarton to Stonehaven, whilst others include a 'range' oxtending from Stonehaven to Ben Nevis, as well as the Cairngorm group, Schieballion, &c. Hector Boece adopted the name in 1527 from Tacitar's Mons Grampius or Grampius, the scene in 86 a.d. of Agricola's crushing defeat of Galgaeus. Where that battle was fought has itself been hotly contested. Ardoch, Dalginross, near Counie, and Urie, near Stonehaven, are among the sites named, but Dr Skene prefers the peninsula formed by the Isla's junction with the Tay.—Grampians, rising to 5600 feet, in the west of Victoria (4, v.).

Grampus (a sailor's corruption of Ital. gran



Grampus (Orea gladiator).

pesce, or Span. gran pez, 'great fish'), a cetaceous animal, common in almost all seas from Greenland

to Tasmania, not unfrequent in the Atlantic, and well known on the British coasts. Constituting the genus Orea, it is the largest of the Delphinidæ, often more than 20 feet in length; its form spindleshaped, but thicker in proportion than the porpoise, from which it also differs in the much greater trom which it also differs in the intensification its dorsal fin, in its rounded head, and its permanent conical teeth. It is remarkable for its great strength and voracity, and is the only cetacean which preys systematically on its warmblooded kindred—on small dolphius and porpoises, beingas, and even whales—the granninses, or 'killers' as English sailors also call them, assembling in herds to pursue whales.

Gran, a royal free-town of Hungary, is situated on the right bank of the Danube, here crossed by a bridge of hoats, 25 miles NW. of Pesth, and opposite the mouth of the river Gran (length, 150 miles). The town is the see of the minute of Hungary, and its great domed cathedral (1821-56), on the castle hill, rivals in its magnificent proportions St Peter's at Rome. The palace of the princearchbishop, who is minate of Hungary, and has a rent roll of \$50,000, is the chief of many buildings in connection with the cathedial. The warm mineral springs of Gran have also some fame. Pop. (1880) 8932. Gran was the cradle of Christianity in Hungary; here St Stephen, the first king, was born in 979, and haptised and crowned in 1000. In the next two centuries it became the greatest commercial town in the kingdom; the old name, Istrogramum ('Danube grain-town'), appears now in the Magyar Esztergom, and the Hungarian-Latin Strigonium. Gran's fortunes never recovered from the storming by the Tartars in 1241.

Granada, an aucient Monrish kingdom of Spain, embracing the south-eastern portion of Andalusia, and now divided into the three modern provinces of Granada, Almeria, and Malaga, the united areas of which amount to 11,062 sq. m., and the united pop. (1877) 1,328,464; (1887) 1,361,456. Except in the narrow strip of const region along the Mediterranean, the surface is a succession of mountain and plateau rising in the centre to the snow-capped Sierra Nevada; but the soil is fertile, and the ancient Granada, which became an independent kingdom after the fall of the caliphate of Cordova in 1236, supported a population of 3 millions, and sent 100,000 men into the field. From 1246 the Moorish kings were obliged to recognise the supremacy of the kings of Castile. A quarrel, supremacy of the kings of Castile. A quarrel, however, which arose between the vascal king of Granada and Ferdinand and Isabella in the 15th contury resulted in a war of cleven years' duration, the result of which was the complete conquest of Granda by the Spaniards in 1492, and the total destruction of Moorish authority in Spain.

The modern province of Granuda has an area of 4928 sq. m., which includes the highest mountains in the Peninsula, and one of the most pieturesque regions in Enrope. A great portion belongs to the basins of the Jenil and the Fardes (Gnadium Menor), tributaries of the Guadalquivir; the Guadalco and other streams flow into the Mediterranean. The climate is warm, but tempered by the snowclad mountain-ranges; the fruitful soil yields the products of both the temperate and subtropical cones. Neither the mineral springs nor the rich deposits of salt, iron, lead, copper, zinc, sulphur, marble, and alabaster are much worked; the silk industry, formerly important, has nearly discovered and the mount of the salt and alabaster are marked in the salt in the salt and the salt in the salt is the salt in th silk industry, formerly important, has nearly disappeared, and the manufactures are now chiefly weaving, sugar and brandy refining, &e.; and the trade of the province, hindered by a rock-bound, inhospitable coast and the absence of roads, is unimportant. Pop. (1877) 479,066; (1887) 480,594.

Grandle, the edible fruit of Passiflora quadrongularis. See Passion-flower.

Granby, John Manners, Marquis of, an English general, the eldest son of the third Duke

formerly capital of the kingdom, has sadly declined since the days of its Moorish masters, but still nanks as one of the largor cities of Spain. It lies at the foot of the Sierra Nevada, on and between at the foot of the Siena Nevada, on and between two hills, the southernmost being the site of the famous Alhambra (q.v.), and is 2245 feet above sealevel, and 126 (by rail 179) miles E. by S. of Seville. It overlooks a fertile and extensive plain, and stands on the right bank of the Jenil, which is here joined by the Dauro. The northern bill is occupied by the Abaiem, the oldest part of the town. The main part of the town lies in the plain to the west of this, on both sides of the Darro, which is here mostly arched over; and the wide which is here mostly arched over; and the wide sularbs of Elvira and Antiquernela stretch farther to the west and not h. The modern town is common-place and dull, with wide streets, open squares, and many-windowed honses; but the old houses, with their flat 100fs, turrets, many-coloured awnings, balconies, and fountains, preserve still a half ariental aspect, and the laby in the of purrow to: oriental aspect, and the laby in the of morrow, tor-tuons, ill-paved lanes that for the most part pass for streets here and there offer picturesque views.

The chief centres of commercial activity are the old and handsome square known as the Vivarrambla and the Zacatin, or old bazaar, a street which still retains much of the Moorish style. On the outskirts of the town there is a shady Alameda. Granada is the seat of an archbishop, and has a university (1531) attended by nearly 1000 students. The cathedral, begun in 1529, is profusely decorated with jaspers and coloured marbles, and cantains the tombs of Ferdinand and Isabella, and of Philip I, and bis consort Juana, fine specimens of Italian Remaissance senly ture, doubtfully attributed to Torrigiano. In the monastery of San Geranino the 'Great Captain,' Gonsalvo di Cordova, is buried. The industry and trade of the town are incansiderable. Pop. (1877) 76, 108; (1887) 66,778. The modern city of Granada was founded by the Moors in the 8th century, not far On the outskirts of the town there is a shady was founded by the Moors in the 8th century, not far from the mins of an ancient Celtiberian town, Illiberis, and rapidly rose to distinction as a wealthy trading city and as a seat of arts and architecture. According to the common account, about 1350 the According to the common account, about 13:00 me pop. numbered 200,000, and at the time of the Spanish conquest reached 400,000; the city was surrounded by a wall fortified with 10:30 towers, contained 70 libraries, and was the scat of 50 schools of learning. But this is more or less legendary.—The etymology of Granada is doubtful, but the worst explanation is that which makes but the worst explanation is that which makes the mane mean ponegranate. The Moors called it Karnattah or Karnattah-at-Tahoud-i.e. Granada of the Jews, to whom this quarter of the early town of the Jews, to which this quarter of the early town was given up, the Arabs retaining Illiberis, which they called Elvira. Karnattah possibly signifies the hill or city of strangers. See Prescotts Ferdinand and Isabella (1837); Washington Irving's Conquest of Granada (1829); Lafrente y Alcantara, Historia de Granada (4 vols. Gran. 1843).

Granada, a department and city of Nicaragua. The department, lying between the Pacific and Lakes Nicaragua and Managua, has an area of nearly 2000 sq. m.; it is mostly a level savannah, but contains the volcano of Masaya and the Mounhacho peak (4500 feet). Pop. about 70,000.—The city stands on the north-west side of Lake Nicaragua, and is connected with Managua by rail. Founded in 1522, it was formerly the chief town of the republic, but has suffered greatly from the civil wars; it is still, however, of some importance as a trading centre. Pop. about 10,000.

of Rutland, was born January 2, 1721. He entered the army, and soon after attaining the rank of lientenant-general (1759) was sent to Germany as second in command, under Lord George Sackville, of the British troops co-operating with the king of Prussia. After the battle of Minden he was appointed commander-in-cluef of the British troops, and held that post during the remainder of the Seven Years' War. After the peace of 1763 he was constituted muster-general of the ordnance, and in 1766 commander-in-chief of the army. He died at Searborough on 19th October 1770. Though very popular in his time, as is evidenced by the frequency with which his portrait was used as a public-house sign, he was the subject of some of the most terrible invectives of Junius. His military qualities appear to have been overrated by his contemporaries.

Gran Chaco, an extensive central tract of South America, extending from the southern tropic to 29° S. lat., and bounded on the E. by the Paraguay and Parana, and on the W. hy the Argentine provinces of Santiago del E-tero and Salta. Its area, about 180,000 sq. m., exceeds that of Great Britain and Ireland by one-half. The portion south of the Pileonayo belongs to Argentinia, and the remaining third to Paragnay; but the possession of the upper section of the Pilcomayo is disputed by Balivia. The country rises gradually from the Paraná towards the north-west as far as 25° 40' S. lat., when it dips to the valley of the San Francisca —part of a great depression extending through Bolivia nearly to the frontier of Peru, and subject to annual innulations. The Chaen is watered principally by two long, narrow, and torthous streams, the Bernejo and the Pileonayo, flaving south east in courses generally parallel, and about 180 miles distant from each other. Only the former has been explared throughout, but it is known that both possess an unusual number of obstructions, though these are quite removable, consisting mainly of shallows caused by the compact argillaceous hed which is a geological characteristic of the whole Chaco subsail. The bed of the Bermejo also oscillates backward and forward, and in 1870-72 the river opened up a new channel (known as the Teuco) for ucarly 200 miles. The most northern part of the Chaco is an extremely arid zone, but the banks of the upper Pilcomayo are fertile and its sands anviferous. To the north of the Berniejo there are numerous and wide marshes and stretches of jungle, drained by many small streams; but the land is well wooded, chiefly with vast seas of palms (here an indication, however, of marshy lands subject to immdation, as the local algoroba is of dry, high land), while south of the Bermejo the primeval forest extends into Salta. The annual rainfull is probably 80 inches, all constants of the salt of the centrated into the six months from November to May; then wide sections become almost a lake district, whilst in sensous of extraordinary floods the Paraguay and the other great rivers create a vaster sea than the Nile. Thus much of the region is of modern alluvial formation, and exceedingly fertile. A very dry season succeeds, and some districts are then utterly waterless, or the wells that have been sunk are impregnated with salt. The average temperature is \$0° F.; the climate is said to be equable, and in the southern section suitable to colonists of the Anglo-Saxau race. Since 1537, when the first exploror, Captain Juan de Ayolas, marched with 250 men into the wilderness from which none ever retained, numerons expeditions have been sent out from the surrounding countries; but the savage tribes (still unsubdued throughout the unexplored interior), swamps, lagoons, and floods defeated all carly attempts to open up the country. In 1884 garrisons

were established along the Bermejo, and since 1885 permanent settlements have been made. Already there are many agricultural colonies and small towns along the Paragnay, connected by rail and telegraph; the Bermejo lands, on both banks for 400 miles from its mouth, have been conceded by the Argentine government for various enterprises; thousands of hands are employed in the timber trade, and steam sawnills are in operation; cattleraising and farming are carried on, and from the sugar-cane refined singar and rum are manufactured. Concessions also have been granted for railways from Corrientes to the Bolivian frontier. See an interesting paper by Captain John Page in Proc. Roy. Geog. Soc. (1889).—Chacu, the Quichna word for 'hunt,' may refer to the great Indian battues; but under the Incas it was applied to the numbering of flocks, and so came to signify wealth—Gran Chaco thus meaning 'great riches.

Grand-combe, L., a town in the French department of Gard, 41 miles NNW. of Nimes. Near it are very important collieries. Pop. 6111.

Grandees (Span. grandes), since the 13th century the most highly privileged class of nobility in the kingdom of Castile, in which the members of the rayal family were included. Their honoms were hereditary; they held lands from the crown on the tenure of military service, were exempted from taxation, could not be summoned before any civil or criminal judge without a special warrant from the king, and could leave the kingdom, and even enter the service of a foreign prince at war with Castile, without incurring the penalties of treason. Besides this, they had the right of being cuvered in the presence of the king. In the national assemblies they sat immediately behind the prelates and before the titled nobility (titulados). Under Ferdinand and Isabella they were deprived of most of their peculiar privileges; and Charles V. converted them from an independent fendal nobility into a dependent court nobility. Under Joseph Bonaparte their dignities and privileges were entirely abolished; but they were partially regranted at the subsequent restoration. Grandees are still members of the senate in their own right.

Grand Forks, capital of Grand Forks county, North Dakota, on the Red River of the North, opposite the month of Red Lake River, is about 55 miles N. of Fargo, at the intersection of two nailways. It has several flour and saw mills, ironworks, and a brewery, hesides a large transit trade in wheat. Pop. 7500.

Grand Haven, capital of Ottawa county, Michigan, on Lake Michigan, and on the south bank of Grand River, 31 miles W. by N. of Grand Rapids by rail. It has a good harbour, with two lighthouses, and ships large quantities of lumber and grain. It contains several lumbermills and ununnfactories of wooden wares, &c.; and a magnetic spring renders the place a summer-resort. Pop. 5914.

Grand Jury. See Jury.

Grand Pensionary. See Pensionary.

Grandpré, a village in the French department of Ardennes, on the river Aire, 40 miles NNE, of Châlons. Here on 14th September 1792 Dimonriez was defeated by the Allies.

Grand Rapids, capital of Kent county, Michigan, stands at the head of steamboat navigation on Grand River, here crossed by six bridges, and at the junction of several railways, 60 miles WNW. of Lansing. The river, which enters Lake Michigan 40 miles below, here falls 18 feet in a mile, and across it extend the rapids which give name to the rown. Conducted by canals, it

supplies motive-power to monerous sawnills and maintactories of furniture and wooden ware, farming implements, flour, machinery, &c., though steam is now in use in most of the factories; gypsum-quaries near the town supply abundant material for starco plaster and kindred preparations. White bricks are also largely made here, and many of the houses and churches are limit of them. The city is the seat of an Episcopal bishop. Pop. (1870) 16,507; (1880) 32,016; (1885) 41,931.

Grand Serjeanty (magna serjeanta. or magnum servitium, 'great service') was one of the most honourable of the ancient fendal tenures. According to Littleton, tenure by grand serjeanty is where a man holds his lands or tenements of on sovereign lord the king by such services as be ought to do in his proper person to the king, as to carry the banner of the king, or his hunce, or to lead his army, or to be his omishal, or to carry his sword before him at his coronation, or his carver, or los botler, or to be one of his chambedains of the receipt of his exchequer, oc to do other like services. These honorary services were expressly retained when the military tenures were abolished in 1661. Strathfieldsaye is held by the Duke of Wellington in grand serjeanty, the service required being the presentation to the sovereign of a flag hearing the national colours on each anniversary of the battle of Waterlao. The service by which the Dake of MacIborough holds the manor of Woodstock is the presentation to the sovereign of a French standard on the audiversacy of the battle of Blenheim.

In Scatland grand sorjently was not known as a separate tenure—that is to say, lands held on condition of honorary services rendered to the sovereign were not attended with any privileges other than those attaching to lands held in a similar manner of a subject superior. In that country a tenure by honorary service was known as a Blanch

Holding (q.v.).

Grandson. Sec Granson.

Grandville, the pseudonyae of Jean Ignace Isidore Gerard, a French caricaturist, who was born at Naney, 3d September 1803. In 1828 he first attracted attention by a series of humorons sketches entitled Les Metamorphases du Jour, in which men with animals' faces show forth the follies and foibles of human nature. This was followed by several similar series of satirical caricatures of social relations, as Animume Parlants, Les Cents Proverbes, Les Fleurs Animees, &c. He also practised political caricature with great success. Besides this line of work, he contributed illustrations to splendid editions of the Fables of Lafontaine, Robinson Crusoe, Gulliver's Travels, &c. Grandville died in Paris, 17th March 1847.

Grangemouth, a rising port in Stirlingshire, 3 miles ENE. of Falkirk. Founded in 1777, and erected into a police-bacgh in 1872, Grangemonth has extensive quays and warehouses, docks (including a large one opened in 1882), a graving-dock, and shipbuilding yards. The trade of the port has risen very capidly. In 1840 the shipping entering and clearing it was 31,686 tons annually; in 1876, 840,326; in 1885, 1,457,991; and in 1888, close upon 2,000,000 tons—the port then ranking fifth in importance in Scotland. Since 1887 there has been a regular line of passeager steamers between Grangemonth and London, awned by the Carron Iron Company, whose works are within 2 miles of the port. The principal imports are timber, hemp, flax, tallow, deals, iron, and grain; and the exports are manufactured iron, and coal. Grangemonth is noteworthy as baving been the place where some of the carliest experiments in Steam-navigation (q.v.) were made. In 1801 the

first Charlotte Dundas was built there. Pop. (1831) 1155; (1871) 2569; (1881) 4560.

Granger, James, born about 1716, was educated at Christ Church, Oxford, and died vicar of Shiplake, in Oxfordshire, in 1776. He published a long popular Beographical History of England (1769; 5th ed. 6 vols. 1824), which was 'adapted to a catalogue of cognaved British heads,' and insisted mucle 'on the utility of a collection of englayed portraits.' His advice led to extraordinary real in collecting portraits, and 'grangerised copies' became the name for works embellished with engravings gathered from all quacters—frequently secured by the unconscionable mutilation of valuable books of all kinds. A grangerised Bible, in 45 vols. folio, contained 6000 prints, and was valued at 3000 guineas. An edition of Leferre's Voltaire in 90 vols. contained 12,000 engravings (nostly partiaits), and cost the labour of twenty years; it sold in 1856 for £800. A gangerised Charendon's Rebellion was illustrated by Mr Subserland at a cost of £10,000. In 1888 a London bookseller land on sale, for £1500, a copy of Boydel's Slankespeare, extended by the insertion of thousands of plates to 36 volumes: the sale price probably did not fairly represent the actual cost of the grangerising.

Grangers, an American actional association of agaiculturists, founded by a government clerk named Kelly in 1867, under the title of 'patrons of husbandey.' The objects of this secret society, with its ritual and its four orders for men and women, are the social improvement and industrial benefit of the farming class; masic and literary exercises at the meetings and the establishment of libraries have proved useful for the former, and organisation and the spread of newspapers published in the interest of famous have advanced the latter object. The discussion of political questions at the meetings is forbidden. In 1871 there were only same 200 granges organised; in 1875 there were 30,000; and, although dissensions for a time greatly reduced the strength of the order, in 1885 at the anomal session of the national granges were represented.

Grani'ens, the ancient name of a small river of Asia Minor, flowing from the northern side of Mount Ida to the Propontis, and now known as the Kodshasa. On its banks Alexander the Great

(q. v.) defeated the Petsians.

Granice de Cassagnac. See Cassagnac.
Granice (Ial. granice, 'gritty;' Lat. granon, 'grain'). This well-known rock is a thoroughly erystalline-granular aggregate of quartz, felspar, and mica. The felspar is generally orthoclase (pink or gray), but some plagioclase is often present. The mica may be muscovite or biotite, and other varieties also occur, but the most common perhaps is muscovite. There is no base or matrix in this rock the several crystals and crystalline granules, confusedly commingled, being bound together by their faces. In crystallising out, the felspar and mica have interferred with each other's development, so that these minerals rarely assume perfect crystalline forms. The quartz still more rarely appears in the form of perfect or even approximately perfect crystals, but occurs as irregular crystalline granules, or seems to be moniled upon and hemmed in between the other minerals. Fluid cavities are generally plentiful in the quartz. As a general rule the component crystals of granite have separated out in the following order: unica, felspar, quartz. Occasionally, however, it is found that the felspar and the quartz have crystallised together, and thus mutually interfered with each other's form. More rarely the formation of the quartz has even preceded

that of the felspar. All varieties of texture are met with among granites, from very fine-grained up to coarsely-erystalline rocks, in which the component erystals may be several inches in diameter. The coarser-grained kinds are called negnatite. In the variety known as graphic granite the quartz is crystallised in the ortho-clase, forming alternate zigzag-shapod lamine, which, on a cross-fracture, present the appearance of Hebrew writing. The accessory minerals, such as beryl, topaz, torrmaline, garnet, sphene, &c., are met with chiefly in irregular cavities, and in such cavities very fine crystals of the essential minerals often ocenr. Scattered through the body of the rock, however, accessory minerals are not uncommon, especially apatite and sphene, and less the common, especially apartite and spinene, and less frequently zircon—these three minerals occurring as inclusions in the essential minerals. The relative proportion of mica, felspar, and quartz varies; in many granites felspar forms more than half of the bulk of the lock—quartz coming next, and mica last. In other granites there is extremely, little grants, while mica is more extremely little quartz, while unica is more plentiful. Sometimes the rock is rendered porphyritie by the appearance of large crystals of orthoclase, embedded in a granitoid or finely-crystalline ground-mass. It is generally the felspur which gives the prevalent colour to a granite—the rock being red or gray according as flesh coloured or white felspur medanizates. Vory flesh-coloured or white felspar predominates. Very often dark patches and nodules occur in granite. Sometimes these are fragments of foreign rocks more or less altered; at other times they are combut in different proportions—mica often predominating. Veins of similar composition are also found ramifying through granite. These and the patches together are supposed to be 'the result of differentiation accompanying the crystallisation of the original magnia'—the dark portions being more basic in composition than the rock in which they occur. Most granites are traversed by lighter-coloured veins—some of which are finer grained and others coarser than the rock in which they appear. The origin of these veins is uncertain. They would appear to be of contemporaneous origin with the granite, and to have sometimes formed in rents of the original pasty magma, possibly by sogregation of the minerals from the surrounding mass. The fine-grained veins, on the other hand property before the other hand, were probably injected before the granite had become quite consolidated. It seems certain at least that the rock of the veins and the granite itself originally formed portions of one and the same molten mass.

Amongst varieties of granite may be mentioned hornblendic granite, in which hornblende is added to the other constituents. When this is the case, mice is only spuringly present. When school mica is only sparingly present. When school (black tournaline) replaces mica, we have schoolaccous granite, Greisen is a granular aggregate of quartz and mica. Aplite is a fine-grained aggregate of quartz and orthoclase, with sometimes a little mica. These three last-mentioned varieties are met with chiefly in veins proceeding from masses of ordinary granite.

Granite usually occurs in great losses or amorphous masses—and frequently forms the nuclei of mountain-chains. Its petrographical characters and behaviour in the field prore it to be of igneous origin, at all events in the great majority of cases, and to have consolidated at con-siderable depths in the earth's crust. Hence it belongs to the Plutonie class of igneous rocks. Some writers have held that certain granites are of motamorphic origin, but the appearances which seem to support this view have of recent years received another interpretation. And although,

in the present state of our knowledge, it cannot be asserted that no granite is of metamorphic origin, yet it would appear that granites of demonstrably metamorphic origin have not yet been discovered. Those which are supposed to be of such origin are intimately associated with crystalline schists. which themselves are believed to be the result of metamorphic changes. At one time granite was looked upon as the oldest of primitive rocks, but it is now known to be of various ages. Its presence at the surface is due of course to demidation, which has removed the great masses of rock that origin-

ally covered it.
The more durable kinds of granite are largely used as building materials in buildges and engineeringworks, and also in public buildings and dwellings. The difficulty of working it makes it expensive, but this is counterbalanced by its great durability. It cannot be cut, like the majority of building-stones, with saws, but is worked first with large hammers, and then with pointed chisels. The success with which the Egyptians operated upon this refractory stone is very extraordinary. They worked and polished it in a way that we cannot excel, if, indeed, we can come up to it, with all the appliances of modern science; and not content with polishing, they covered some of the blocks with the

inost delicate and sharply cut hieroglyphics!

The granites best known in the British Islands The granites best known in the British Islands for ornamental purposes are the gray Aberdeen granite and the reddish-coloured Peterhead granite. Of this last-montioned variety handsome polished columns for public halls have been constructed. On the Continent granite has been quarried for similar purposes in several countries; as near Baveno in Italy, and in the islands of Sardinia and Elba; in Normandy and Brittany; in southern Sweden, Finland, the Tyrol, Switzerland, &c. In North America granity are worked at a purpley North America granites are worked at a number of places, as in Maine, New Hampshire, Massachusetts, Connectient, New York, Michigan, and California, and at various places in the Canadian province of Quebec. The rock would probably be more abundantly used than it is, were it not for the fact that in many eases it occurs at elevations and in districts more or less difficult of access,

The soil produced by the weathering of granitic rocks should be fertile, as their component ingredients yield the necessary elements. But in hilly districts, where granite is chiefly developed, the line clay which results from the decomposition of the felsiar is washed away, so that only the quartz sand is left on the slopes—forming a thin, ungrateful soil. In the hollows and flats whither the clay is transported we find generally a cold, stiff, and wet sulsoil, which is only worked with difficulty. In low-lying granitic tracts, especially under genial climatic conditions, the soil which results from the weathering of granite is sometimes very fertile. See Geo. F. Harris, Granite and the Granite Industries (1888).

Gran Sasso d'Italia ('Great Rock of Italy'), also called Monte Corno, from the resemblance to a horn which it presents on the east, is situated on the bordors of the Abruzzi, between Teramo and It is the highest summit of the Apennines, having an elevation of 9574 feet.

Granson, or Grandson, an ancient town in Switzerland, on the Lake of Neuchâtel, 21 miles SW. of Neuchâtel; pop. 1762. Here in 1476 the Swiss defeated Charles the Bold (q.v.).

Grant, in English law, the conveyance of property by deed. Movables are granted when they are comprised in a bill of sale or deed of gift. Incorporeal hereditaments, and interests in land not involving actual possession, were also said to lie in grant; but a freehold in possession could 354 GRANT

only be conveyed by livery of seisin—i.e. by solemn delivery of possession. The Real Property Act of 1845 enacted that the immediate freehold might be conveyed by deed of grant. It is no longer necessary to use the word 'grant;' other words, such as 'convey,' will have the same effect. A grant of the reversion of hand under lease was formerly completed by the lessee attorning (becoming) tenant to the grantee; but the necessity far attornment is now abolished. In the United States generally livery of seisin is dispensed with, and the term 'grant' applies to all transfers of real property.

Grant, FAMILY OF. Among various conflicting theories as to the origin of this family, the most probable is, as the name seems to indicate, that it is of Norman extraction, and that it was intro-duced into Britain at the Conquest. Occasionally it appears in parts of England; but by the middle of the 13th century it had established itself in the north of Scotland-Laurence le Grant holding the responsible office of sheriff of Inverness in 1263. He and his descendants acquired large territories in the great Caledonian Glen, and also in Strathspey, Frenchie, now Castle Grant, near Grantown, becoming their principal barony and residence. The sixth laird of Frenchie was knighted by King James VI., and his grandson had his lands creeted into the regality of Grant—whence their designation since. Sir Ludovick Grant, fourth laird of Grant, married as his second wife, Lady Margaret Ogilvie, daughter of James, litth Earl of Findlater and Scalield, and, through this marriage, their grandson succeeded in 1811 to the earldom of Scafield, assuming the surname of Ogilvie in addition to that of Grant. Through another marriage, a younger brother of the fourth laird of Grant succeeded to the estates of the Colqubonus of Luss, and, assuming the surname of Colqubonn, became the ancestor of the present family of that name. The Chiefs of Grant (3 vols. 4to, 1883), prepared by Sir William Fraser, K.C.B., for the family, presents a listory of its descent, and also shows the discovering of the propagation of the present family of the propagation of the present family of the propagation of the present family of that name and the propagation of the present family o dispersion of its munerous cadet branches, many members of which have become distinguished in various spheres of life.

Grant, Sir Alexander, of Dalvey, was born at New York in 1826, and represented one of the oldest branches of the Clan Grant. Educated at Harrow and Balliol College, Oxford, he graduated B.A. in 1848, and was elected to an Oriel fellowship. Here he edited the Ethics of Aristotle (1857), with English notes, a work which still maintains a reputation by its suggestive preliminary essays. He succeeded as baronet in 1856, was appointed inspector of schools at Madras in 1858, and became professor of History in Elphinstone College there; then its principal; and afterwards vice-chancellor of Elgiu College, Bombay, in all which positions he did much to promote the interests of education in India. On the death of Sir David Brewster he was in 1868 chosen as principal of the university of Edinburgh, an office which he enjoyed for sixteen years, during which took place the inauguration of the new medical school, and the tercentenary celebration of the university. His Story of the University of Edinburgh (1884) was published in connection with the latter event. Earlier works were Aristotle and Recess Studies (1870), a volume of essays written by various scholars. The universities of Ellinburgh and Glasgow conferred upon him the degree of LL.D., and Oxford that of D.C.L. He married, in 1859, Susan, daughter of Professor Ferrier of St Andrews, and died suddenly on 1st December 1884.

Grant, MRS ANNE, a miscellaneous writer, whose works were among the first to draw public

attention to the romantic scenery and peculiar manners of the Scottish Highlands, was born in Glasgow, 21st February 1755. She was the daughter of a British officer, Dunean M'Vicar, who became barrack-master of Fort-Augustus. She married in 1779 the Rev. James Grant, formerly chaplain of the fort, minister of Laggan. Left a widow in destitute circumstances in 1801, Mrs Grant published by subscription a volume of Poems (1803), which were well received; Letters from the Mountains (1806), a highly popular work; Memoirs of an American Lady (1808); Essays on the Superstitions of the Highlanders of Scotland (1811), &c. in 1825 she received a pension of £100 a year, and by legacy from Sir William Grant, Master of the Rolls, she enjoyed a similar annuity. She died on 7th November 1838. A memoir of her life, and a selection from her correspondence, forming a continuation of her Letters from the Mountains, were edited by her son, J. P. Grant, in 1844.

Grant, Charles, Lord Glenelg, son of Charles Grant, sometime M.P. for Inverness-shire, and a distinguished director of the East India Company, was born at Kidderpur, near Calcutta, in 1779. He was of the Grants of Sheughe, cadets of the Grants of Grant. He was educated at Magdalene College, Cambridge, where he took his degree of M.A. in 1804. In 1805 he published a mem on the Restoration of Learning in the East, which had won the university prize awarded by Dr Clandins Buchmoan. He was called to the bar in 1807, but never practised. In 1811 be was elected M.P. for the Inverness district of burghs; and afterwards, succeeding his father in the county representation, continued in the House of Commons till 1835, when he was mised to the pecrage. Grant held for live years the office of a Lord of the Treasury, and in 1819 was appointed Scoretary for Ireland, which he continued to he for about two years. As Irish Secretary he endeavoured to suppress the Orange demonstrations, to seeme the importial administration of justice, and to devise a system of national education adapted for Catholics as well as Protestants. From 1823 to 1827 Grant was Vice-president of the Board of Trade; from 1830 to 1834 President of the Board of Control; and from 1834 to 1839 Secretary for State for the Colonies. After this he withdrew in a great measure from public affairs, but supported the Liberal party by his vote. He died at Cannes, in France, in 1866, unmarried. Lord Brougham pronounced Grant to be 'the purest statesman he had ever known.' He was an eloquent speaker, though, partly from diffidence and partly from indolence, he spoke but seldom. Some of his despatches as colonial secretary, on the rights of the matives in the colonies, on repressing idolatry, and abolishing slavery throughout the British possessions in South Africa, are models of elevated and just thought, and of fine impressive English.

Grant, Sir Francis, fourth son of Francis Grant of Kilgraston, Perthshire, was born in Edinburgh on 18th January 1803. He was educated at Harrow and the university of Edinburgh for the Scottish bar, but abandoned that profession to follow his natural genius for painting. A noble portrait by Velasquez is said to have exercised an especial influence over the young painter's future career. His first picture was exhibited in 1834, when he at once took rank among the best portrait painters of the day, and was regarded as a worthy successor of Lawrence. His most famous works are those in which he has combined the likenesses of distinguished characters with scenes of English sport. The 'Meet of H.M. Staghounds,'

GRANT

painted in 1837 for Lord Chesterfield, and containing no less than forty-six portraits; the 'Melton Hint,' executed for the Duke of Wellington; and the 'Cottesmore,' for Sir R. Suttan, are the best known in this class. Among his other paintings may be mentioned the equestrian portraits of the Queen and Prince Consort for Christ's Hospital; the picture of the heantiful Marchioness of Waterford; and those of Lords Palmerston, Russell, Gough, Macaulay, Hardinge, &c. In 1842 Grant was elected Associate, and in 1851 Academician. In 1866 he became President of the Royal Academy and was knighted. In 1870 Oxford conferred upon lim the degree of D.C.L. He died on 5th October 1878.

Grant, JAMES, of Corrimony, in Inversesshire, a cadet of the Grants of Grant, born in 1743, died in 1835, was anthor of Essays on the Origin of Society (1785) and Thoughts on the Origin and Descent of the Gael (1814).

Grant, James, military novelist, was born in Edinburgh, 1st August 1822, and in 1832 sailed with his father, an army officer, for Newfoundland. Home again, in 1839 he was gazetted to an ensigney in the 62d Foot, but within a few years resigned his commission, and turned to literature. Having already contributed copiously to the United Service Magazine and the Dublin University Magazine, ho in 1846 published his first book, The Homance of War. Since then he supplied his legion of readers with a long and close series of novels and histories, illustrative mainly of war, and, more particularly the achievements of Scottish arms abroad. Among his many works may be mentioned Adventures of an Hide-de-Camp; Adventures of Rob Roy; Frank Hitton, or the Queen's Own; Bothwell, or the Dark Days of Queen Mary; The Yellow Frigate; Harry Ogilvie; and Old and New Edinburgh. Most of his works have reappeared in German and Danish, as also a few in French. In 1875 Cardinal Manning received him into the Roman communion. He died in London, 5th May 1887.

Grant, Colonel James Augustus, C.B., R.R.S., was a son of the Rev. James Grant of Naim, where he was born in 1827. Having heen educated at the grammar-school and Marischal Callege, Aberdeen, he was in 1846 appointed to the Indian army. His services at the battle of Gujerat, under Lord Gough, gained him the medal and two clasps, and his further services in India, in the course of which he was wounded, were homented by the Mntiny medal and clasp for relief of Lucknow. With Captain Speke he explored (1860-63) the sonrees of the Nile. He also received the medal for services in the Abyssinian Expedition of 1868. Among his publications are A Walk Aeross Africa; 'Summary of the Speke and Grant Expedition,' in the Jour. Roy. Geog. Soc. (1872); Botany of the Speke and Grant Expedition, and Khartoum as I saw It in 1863. He is gold medallist of the Royal Geographical Society.

Grant, Sir James Hope, general, brother to Sir Francis, was horn at Kilgraston, Perthshire, 22d July 1808. He first saw service in the Chinese war of 1842, and next distinguished himself at Sobraon, Chillianwalla, and Gujerat in the two Sikh wars. During the operations of the Indian Mutiny Grant, who had risen to the rank of licutenant-colonel, took a leading part, assisting in the recapture of Delhi (20th September), in the relief of Cawnpore, and in the retaking of Lucknow, and he commanded the force which effected the final pacification of India. In 1859 he conducted the war against China, defeating the enemy three times under the walls of Pekin, assaulting the Taku forts, and finally capturing the capital of

the empire, for which work he was created G.C.B. After commanding the army of Madras from 1861 to 1865, he returned to England, and was made general in 1872. He died in London, 7th March 1875. From his journals appeared Incidents in the Sepoy War of 1857-58 (1883) and Incidents in the China War of 1860 (1875), both edited by Captain H. Knollys.

Grant, Mrs, of Carron, author of the popular song, 'Roy's Wife of Aldivalloch,' was born near Aberlonr, Bauffshire, in 1745. She was twice married—first to her cousin, Captain James Grant of Carron, in Strathspey; and afterwards to Dr Murray, a physician in Bath. She died at Bath in 1814.

Grant, ULYSSES SIMPSON, eighteenth president of the United States, was born at Point Pleasant, Clermont county, Ohio, April 27, Copyright 1890 in U.S. 1822. He was of Scottish an by J. B. Lippincott cestry, but his family had been Company. by J. B. Lippincott Company. American in all its branches for eight generations. Ulysses was the eldest of six children born to Jesse R. Grant and his wife Hannah Simpson, and assisted his father on the farm in summer, attending the village school during the winter. In the spring of 1839 he was appointed to a cadetship in the United States Military Academy, and gradu-ated in 1843. He was commissioned brovet secondlieutenant, and assigned to duty at Jefferson Barracks, Missonri. In May 1844 he accompanied his regiment, the Fourth Infantry, to Louisiana, and in September 1845 he was commissioned second-licutenant, and joined the army of occupation under General Zachary Taylor. Grant participated in the battles of Pala Alta and Resaca de la Palma, and was also present at the capture of Monterey. Later the Fourth Infantry embarked for Yera Cruz, to join the army of General Winfield Scutt, and Grant took part in all the battles of Scutt's success-Mexico. In the Summer of 1848 his regiment returned to the United States, when he obtained leave of absence, and in August of that year was married to Julia B. Dent, of St Louis, by whom he had three sons and a daughter, the eldest of whom, Colonel Frederick D. Grant, was in April 1889 appointed American Minister to Austria. Lieutenant Grant served at various posts; was in 1853 appointed to a captaincy; and in the following year resigned his commission, and settled on a farm near St Louis, Missouri.

When the war began in April 1861 Grant was residing in Galena, Illinois; he immediately offered his services to the government, and in June he was appointed colonel of the 21st Regiment of Illinois. Infantry, with which he was sent to Missonri. In Angust he was advanced to brigadier-general of volunteers, and assigned to the command of a district, and in November he fought the battle of Belmont. In February 1862 he captured Fort Henry, and ten days later Fort Douelson, with 14,623 prisoners, for which victories he was made majorgeneral of volunteers. In April Grant fought a two days' battle at Shiloh, amongst the severest of the war, in which General A. S. Johnston, commanding the Confederate army, was killed. After varions unsuccessful movements against Vicksburg, which commenced in the November of 1862, Grant crossed the Mississippi, April 30, 1863, defeated the enemy at Port Gibson and at Champion Hill, and drove them behind their entrenchments at Vicksburg, to which place he laid siege. After many assaults, the stronghold surrendered unconditionally on July 4, 1863, with 31,600 prisoners and 172 cannon, and the Mississippi was opened from its source to its mouth. In October Grant was ordered to Chattanooga,

where he fought a hattle, capturing the enemy's entire line, and driving him out of Tennessee. March 1864 Grant, having previously been made a major-general in the regular army for his victory at Vicksburg, was promoted to the grade of lientenantgeneral, and assigned to the command of all the general, and assigned to the common of the armies of the United States, with his headquarters with the army of the Potonne. His plan of campaign was to concentrate all the national forces into several distinct armies, which should operate simultaneously against the enemy, Sherman moving toward Athura, while Grant himself accompanied the army of the Potonne against Richmond. During the night of May 4 the latter crossed the Rapidan, encountered General R. E. Lee in the Wilderness, and fought a desperate three days' battle, one of the fiercest of modern times. Grant moved forward on the 7th, and fought again at Spott-ylvania Courthouse on the 10th, and still again on the 12th, on which occasion he captured an entire division of the Confederate army. The smoke of battle lung over the mighty hosts for six days, while the North remained in a state of suspense bordering upon agony; but on the 11th Grant wrote to Washington, 'I propose to light it out on this line, if it takes all summer.' Thus, fighting and flanking, ever pursuing the offensive, and daily drawing nearer to Richmond, he at length drove the enemy within the defences of that city, and there held him in a vice, while he left to his lieutenants—Sherman, Sheridan, and Thomas—a harvest of laurols by active movements and successful battles. On March 29, 1865, there began a week's hard fight-ing, at the close of which Lee surrendered his entire army at Appointation Courthouse, April 9, receiving from his victor most generous terms. The fall of Richmond substantially ended the war, and Grant returned to Washington to prepare his report of the operations of the armies of the United States from the date of his appointment to command the same. and to muster out nearly a million of troops that

the country no longer required.
In July 1866 Grant was advanced to the grade of full general, and in May 1868 he was nominated for the presidency by the Republican convention, and in the following November was elected. Out of the 201 electoral votes Grant received 214, and Horatio Seymour, the Democratic candidate, 80. He was again elected to the presidency in November 1872, thus filling the office of chief-nungistrate for eight Among the most important events of his administration were the adoption in 1869 of the fifteenth amendment to the constitution, which guaranteed the right of suffrage without regard to race, colour, or previous condition of servitude; and the peaceful settlement of the Alabama Claims the peaceth settlement of the Algebraic Cleans, (see ALABAMA). After retiring from the presidency, General Grant spent two years in foreign travel, receiving musual attentions from the rulers of the various countries which he visited in his tour round the world. In June 1880 his name was again presented to a Republican convention, but, chiefly owing to a traditional sentiment against a third term of the presidency, the require time was given to James A. Garfield. In nomination was given to James A. Garfield. 1881 Grant purchased a house in New York, where he afterwards passed his winters, while his summers were spent in his seaside cottage at Long Branch, New Jersey. Finding himself mable with his income to properly maintain his family, he became a partner in a banking-house in which one of his sons and others were interested, bearing the name of Grant and Ward, and invested all his available capital in the business, but taking no part in the affairs of the firm, which were left almost entirely in the hands of the junior partner. In May 1884 the house, without warning, suspended, and it was then discovered that two of the partners had robbed

the general and his family of all they possessed. Until this time Grant bad refused all solicitation to write the history of his military career; but now, finding himself bankunpt, and with the lope of providing for his family, he began the preparation of his personal memoirs. The contract with his publishers was made February 27, 1885, and the work appeared about a year later. In the sammer of 1884 he complained of a soreness in his throat, and an examination detected the presence of cancer at the root of the tongue. The sympathies of the nation were now aroused, and on March 4, 1885, congress passed a bill creating him a general on the retired list, thus restoring him to his former rank in the army, which he had lost on accepting the presidency. It may be doubted if since the world began any book has been written under similar conditions; the dying soldier, suffering constant and at times the severest agony, yet struggled on successfully, completing his literary labours only four days before his death at Mount McGregor, near Sanatoga, New York, 23d July 1885. His remains were removed to New York, and on Angust 8 were interred with great pomp in Riverside Park, overlooking the Hadson. Many lives of Grant have been written, the most valuable of which is his own (2 vols, 1885–86), a work that brought his widow no less than \$500,000.

Grantham, a market-town of Lincolnshire, on the left bank of the Witham, 25 miles SSW, of Lincoln, and 105 NNW, of London. It lies on the ancient Ermine Street, and is an important junction on the Great Northern Railway; whilst a canal (1793), 30 miles long, connects it with the Trent near Nottingham. High over the red-tiled brick houses soars the noble gray spire (278 feet high) of St Wolfran's Church, which, in style mainly Early English of the 13th century, has been finely restored by the late Sir G, G. Scott since 1865. An Eleanor cross was demolished in 1845, and a castle has left no trace; but the quaint Augel Iun is still standing, in which Richard III, signed Buckingham's death-warrant. Of King John, too, Grantham has memories, and of Oliver Cromwell, who here on 13th May 1643 won his first success; but the town's greatest glory is 'Sir Isaac Newton, who during 1655-56 idled, fought, and rose to be head-boy in its grammar-school. A bronze statue of him by Theed was elected in 1858. The said school was founded by Bishop Fox in 1528, re-endowed by Edward VI. in 1553, and reconstituted in 1870. The manufacture of agricultural implements, malting, and brick-making are the chief industries. Grantham was incorporated by Edward IV. in 1463, and from theu till 1885 returned two members to parliament—a munber reduced now to one. The borough boundary was largely extended in 1879. Pop. (1851) 10,873; (1871) 13,250; (1881) 17,346, of whom 16,886 were within the municipal borough. See the local histories of Turnor (1806), Marrat (1816), and Street (1857).

Grant Land, a North Polar region, lying north of Grinnell Land, between \$1° and \$3° N. lat., discovered by Hayes, Hall, and Nures in 1875, and partly explored by Narcs, who wintered on its coasts, in the most northerly latitude (82° 27') in which the winter has been passed by any ship.

Granton, a harbour on the Firth of Forth, 3 miles NNW. of Edinburgh. It was constructed by the Dake of Bucelench in 1835-45 at a cost of nearly a quarter of a million.

Grantown, a village of Elginshire, # mile from the Spey's left bank, and 142 miles by rail N, by W. of Edinburgh. Founded in 1776, and created a police-burgh in 1890, it is a popular holiday resort. Pop. 1374. Granulations, the materials of new texture as first formed in a wound or on an ulcerated surface. See INFLAMMATION, CICATRISATION, WOUNDS, ULCER.

Granulite, or LEPTYNITE, a schistose but sometimes massive aggregate of quartz and orthoclase with garnets. The garnets are discominated irregularly, and are not infrequently accompanied by Kyanite (q.v.). This rock is classed with the crystalline schists.

Granvella, Antoine Perrenot de, Cardin M., one of the ablest champions of the Church of Rome in the 16th century, was born in 1517 at Ornans, Burgundy. He studied law at Padua, and theology at Louvain. A canon for a short time at Besancon, he was in 1540 appointed Archbishop of Arras. His father now chancellor of the empire under Charles V., he was entrusted with many diplomatic missions, which he discharged with marked ability. Succeeding his father in the chancellorship in 1550, he accompanied Charles V. in the flight from Imsbruck, and framed the treaty of Passau, 1552. On the abdication of Charles in 1555 he transferred his services to Philip II. In 1559 he was appointed prime uninister to Margaret of Parna in the Netherlands. In 1560 he was created Archbishop of Malines, and next year was made cardinal. Such, however, was the hostility which his policy of repression provoked in the Low Constries that at the king's advice he retired in 1564 to Franche Comté. After six years of comparative quiet he in 1570 represented Spain at Rome in drawing up a treaty of alliance with Venice and the papal see against the Turks. For five years (1570-75) he successfully held the office of viceroy of Naples. He died at Madrid in 1586.

Granville, a fartified scaport in the French department of La Manche, is situated on a rocky promontory on the English Channel, 23 miles NE. of St Malo. The 15th-century church and a hydrographic college are the principal institutions. Chief industries, lishing (oysters and cod), shipbuilding, manufacture of brandy, chemicals, ironware, and tanning; chief exports, fish and buildingstone; chief imports, salt, manure, corn, and flour. Pop. (1886) 11,513. The town has been captured by the French (1450) and the English (1695), and the English (1803).

Granville, EARL. See CARTERET.

Granville, George Leveson-Gower, second Earl, statesman, was born May 11, 1815, being the eldest son of the first earl. He was educated at Eton and Oxford, and entered parliament in 1836 as member for Morpeth, exchanging that seat for Lichfield in 1840. His long and intimate acquaintance with foreign politics began at this time, and he filled for a brief period the post of Under-sceretary for Foreign Alfairs. He was a consistent Liberal and a free-trader. He succeeded to the peerage in 1846, and five years later entered the cabinet of Lord John Russell, holding the seals of the Foreign Office. From that time forward he held office in every Liberal ministry. He became President of the Council in 1853, and leader of the House of Lords in 1855. He laboured ardnonsly in connection with the great exhibitions of 1851 and 1862. Lord Grauville was charged to form a ministry in 1859; but having failed to do so, he joined Lord Palmerston's second administration. He retired with Earl Russell in 1866, having the preceding year been made Lord Warden of the Cinque Ports. In December 1868 he was appointed Colonial Secretary in Mr Gladstone's first ministry, and on the death of Lord Clarendon in 1870 became Secretary for Foreign Affairs. He arranged the treaty between England, France, and Prassia

guaranteeing the independence of Belgium; and confirmed with Prince Gortschakoff the agreement that Afghanistan should form an intermediary zone between England and Russia. His lordship went ont of office in 1874, took the temporary leadership of the Liberal party on Mr Gladstone's retirement in 1875, and for six years led the opposition in the House of Lords with ability and spirit. In 1880 he again became Foreign Secretary under Mr Gladstone, and displayed considerable diplomatic skill in matters relating to the Berlin Treaty, the occupation of Tunis, and the level of Arabi Pasha in Egypt. He issued a circular note to the powers on Egyptian reforms, and in 1884 convened a conference on Egyptian finance, which proved abortive owing to the hostile attitude of France. Troubles in the Soudan, difficulties with Germany in consequence of Prince Bismarck's colonial schemes, differences with France, and the threatened inplare with Russia over the demara-tion of the Afghan boundary caused Lord Granville much solicitude during the closing years of Mr Gladstone's second administration. He retired Gladstone's second administration. with his chief in 1885, but returned once more to office as Colonial Secretary in 1886, resigning again with his colleagues in August of the latter year. Lord Granville is a supporter of Mr Gladstone's Home-rule policy.

Grape. See VINE.

Grape-hyacinth (Muscári), a genus of bulbous-rooted plants, of the natural order Liliacer, nearly allied to the hyacinths, but differing in the globose or subcylindrical perianth, contracted at the month, and 6-toothod. The species are natives chiefly of the countries near the Mediterraneau, and the warmer temperate parts of Asia. Most of them are now frequent in our flower-borders. M. moschatum has a smell of musk. M. racemosum, popularly named Starch Hyacinth, is a somewhat doubtful native of the south-eastern counties—having, it is believed, escaped from gardens—of England. The flowers of the grape-hyacinths are mostly normally blue, but there are pure white varieties of some species.

Grape-shot, called also tiershot, consists of small iron balls piled round an iron pin, holding together a series of parallel iron plates of the same diameter as the gnn from which they are to be fired, between which are the shot, kept in their places by holes in the plates. On being discharged they spread over a wide area. In another pattern called quilted grape the shot are held together on the central pin by canvas instead of iron plates. Both



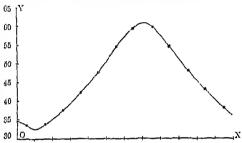
Grape-shot.

have now almost ceased to be used, their place being taken by case shot, sometimes called canister.

Grape-sugar. See Sugar.

Graphic Methods. Under Composition and Resolution of Forces it has been noticed that the point of application, the direction, and the intensity of any force may be represented by the end, direction, and length of a straight line. Similarly, any other physical quantity, such as temperature, atmospheric pressure, or barometric height, electric potential, &c., may be represented by straight lines. Such modes of showing the value of a quantity are called graphic methods; they are largely employed in physical investigations as aids to calculation, and for the purpose of exhibiting the nature of the law according to which some phenomena vary. The principal use of this method is to show the mutual variations of two quantities. This we will illustrate by a particular example.

Suppose a table is drawn up, in one column of which are the months of the year, and in the other the corresponding average temperatures of the air, at some particular place, during these months (the average temperature to each month being the mean of the duily temperatures). Let two lines, OX and OY, be drawn from O, one horizontally, the other vertically; let the successive months of the year be represented on any convenient scale along OX, and let temperature be measured along OY, also on a convenient scale. Corresponding to each month in the year there will be a length along OX, and to each temperature there will corresponding to each month draw perpendicular to OX a line representing the temperature on the scale of OY. A series of lines will thus be obtained,



Jan. Feb. Mar. Ap. May Ju. Jul. Aug. Sep. Oct. Nov. Dec

through the upper ends of which there may be drawn, freehand, a smooth curve. The points on the curvo in the figure represent the upper ends of these lines. A general glance at such a curve will reveal certain features regarding the temperature of the whole year; at what dates maxima and minima occurred; when the temperature or fell quickest, and so on. Such a curve, representing the gradual change of daily temperature, may be produced automatically by photographic representation: a sheet of sensitised paper passes uniformly, by means of clockwork, behind the themometer stem, in front of which is placed a source of light; the paper above the mercury column is blackened, that below being left unaffected; the curve separating the black and white postions represents the temperature at different times. The same principle is used in the thermograph, barograph, and tide-gauge recording machine.

Instead of time and temperature any other two variable quantities may be taken. When the curve obtained by such graphical methods has some regular geometrical features the mathematical law of the phenomenon may be found;

and many qualitative and quantitative results in physics are obtained in this way. It must be remembered that such graphical representations do no more than embody the results of observation or experiment, and cannot be made more accurate than the data themselves.

accurate than the data themselves.

The graphic method is so largely employed in physical science, and also in statistics, that only a few instances of its application may be given. Watt's Indicator Diagram shows the amount of

work done in a complete (double) stroke of the piston; it acts on the principle that the force applied multiplied by the distance through which it acts is a measure of the work done. Pressure and volume are therefore the variables here involved. The temperature of a body at different times may be given by a curve, from which may be found the rate of cooling; a curve may also represent the

temperature at different points of a body, and from it may be deduced, if its thermal conductivity be known, the flux of heat across any section of it. The thermo-electric diagram (see Tait's Heat) is also a valuable application of the method. Andrew's diagram of the volume of carbonic acid gas under varying pressure may be mentioned as another (see Andrew's Collected Scientific Papers, Lond., Macmillan, 1889). The method has also many applications in electricity—e.g. the 'arrival' curve in a submanine cable; and in sound, where accountie vilnations, beats, and harmonics may be graphically represented.

Graphic Statics. When forces simultaneously act on a particle which remains at rest they are in equilibrium, and, if there be three of them, lines drawn so as to represent the respective forces in magnitude and direction may be so arranged as together to form the well-known Thiangle of Forces. Problems in which trigonometrical methods of finding the magnitude and direction of the third side of such a triangle (the resultant) are applied, when those of the other two (the components) are known, or of resolving any given force in any given direction into two 'components' in any two assigned directions, are of common occurrence in text-books. For practical purposes, however, it is very useful actually to draw to scale the triangle of forces appropriate to the data of any particular case; two sides being thms drawn to scale, the third side can be laid down by simply joining two points, and then the line so drawn can be measured with respect to its length and its direction. Similarly the resultant of a number of simultaneous forces can be usefully of a number of simultaneous forces can be assently ascertained by drawing the corresponding Polygon of Forces, and ascertaining the lie and the length of the missing side. The utility of this graphic method is, however, most fully seen in the recent extensions of this method to engineering work. The subject of Graphic Statics is a large one, and we can do little more here than refer the reader to Catarill's duplied Machanics, which gives, inside to Cotterill's Applied Mechanics, which gives, incidentally, full references to the literature of the subject; but in order to give an idea of the nature of the method one il-

lustration may here be supplied. Suppose a bridge-girder (weightless) made up of two



Fig. 1.

N giders in ten divisions (fig. 1), the diagonals being all so arranged as to be in tension; it is 100 feet long, and a load of 100 tons is distributed over it so as to rest uniformly upon the lower booms. Find the stress in each bar. First draw the girder to scale, and mark the bars as in fig. 2: The lower boom of each division may, so far as the

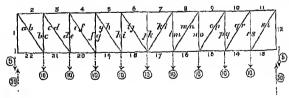


Fig. 2.

girder at large is concerned, be considered as having its proportion of the uniform load (10 tons) arranged in 5-ton loads at its two ends; hence at the angle between 1 and 22, and also at 12-13, there are imaginary loads of 5 tons; at be, de, fg, &c., imagine 10-ton loads. The supporting piers each exert an upward pressure of 50 tons. There is equilibrium, and this equilibrium may be traced out

at every angle of the structure. At the angles 1-22 and 12-13 the upward pressure of the piers is partly neutralised by the local weight of 5 tons; the vertical bars 1 and 12 have cach an upward thrust of 45 tons, which carries the girder; but at these angles there are no horizontal components

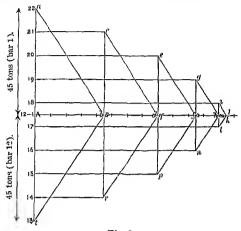


Fig. 3.

along 22 and 13, which, therefore, have no thrust along them, and are neither compressed nor in tenalong them, and are neither compressed for in tension. If a vertical line a t (fig. 3) be drawn, each division in which represents 10 tons, the distribution of load may be set out by taking a starting-point, A: then there is in the girder, from 1 round to 12, no load introduced; between 12 and 13 there is introduced what is equivalent to an upward force of the first term in how 12, and the representation of this is 45 tons in bar 12, and the representation of this is

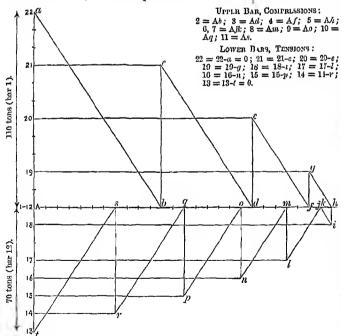


Fig. 4.

upwards, to 14; so for each of the junctions as far as 21-22, and then at 22-1 there is an upward 45 tons in bar 1, the setting off for which brings us back to A. At the junction 1-2 we have three bass in equilibrium; these are 1, 2, and ab; the stress in 1 equilibrium; these are 1, 2, and ab; the stress in 1 is 45 tons; drawing a triangle, Aab (fig. 3), in which the sides are parallel to 1, 2, and ab, we find the relative compressions in 1 and 2, and tension in ab. At the next junction, ab-bc (fig. 2), we have four balanced forces, the tensions in 21 and ab, compression in bc, and a load of 10 tons. From the extremition of ab, bc, ab, bc, ab, bc, ab, ties of ab (fig. 3) draw 22-21 representing the 10 ton load acting downwards, and bc a line parallel to bc in fig. 2; join 21 and the line bc by a line parallel to the rod 21, the tension in which is now represented by the line 21-c, while bc (fig. 3) represents the compression in bc (fig. 2). Next consider the innetion 2-3; four bars, 2, bc, cd, and 3; 2 we know (=Ab, fig. 3), and also bc; we draw a line cd, and a line parallel to 3 which, in order to complete the polygon, can only start from A; Ad and cd represent compression and tension in 3 and cd respectively. At the next junction, 21-20, we have $21 (\approx 21-c)$, cd (= cd), de (unknown), 20 (unknown), and a 10-ton load; the polygon is completed by 20c and de drawn from the ends of the broken line de 21-20. Step by step, by mere drawing of intersecting lines, and by a process which, once the foundation has been laid by setting out the distribution of loads, is far more expeditious and simple than the explanation of it can at first enable it to appear, fig. 3, the measurable diagram of the girder-bar stresses, is evolved, and it is seen that as we near the centre the tensions on the diagonals diminish, that the vertical bar jk is neither under compression nor tension, and that the bars 6 and 7 are under the maximum compression (=A-jk), and the bars 18 and 17 under the maximum tension (18-i, 17-i). It will be seen that the diagram is symmetrical; but, if we take the case of a non-uniformly distributed load,

the diagram becomes unsymmetrical. Suppose another 100 tons to be laid uniformly upon the lower booms of the left-hand half of the girder : now the piers respectively support 125 and 75 tons; the stresses in bars 1 and 12 are 110 and 70 tons; the diagram, built up on the same principles as in the preceding case, and drawn to a scale reduced to three-fourths, takes

the form shown in fig. 4.

See R. H. Smith, Graphics; or the Art of Calculation by Drawing Lines (1889).

Graphis (Gr. graphō, 'I write'), a genus of lichens, which gives its name to a tribe, Graphidee, remarkable for the resemblance which the fructifieation (apothecia, or shields) assumes to the forms of the letters of oriental alphabets. scriptu is common in northern Europe, but of the twenty species the great majority are tropical. Some are said to assist in the identification of cinchona barks of particular species, growing on certain kinds and not on others.

Graphite. See BLACK LEAD. Graphophone. PHONOGRAPH.

prepared for by setting off 4½ divisions downwards; then between 13 and 14 there is a downward load of 10 tons, and the diagram sets off one division was sketched with silicate on a prepared chalk

surface, and the chalk brushed away from between the lines. From the chalk an electrotype could be taken. It had a temporary partial success, but has been in turn completely superseded by the zincotype and other processes. See ILLUSTRATION.

Grappic-plant (Uncaria procumbens), a procumbent plant of the same genus with the Gambir (q.v.), a native of South Africa. The seed-vessel has many hooked thorns, and clings most tenaciously to any animal—a provision for the distribution of the seed. When it lays hold of the month of an ox, Livingstone says, the animal stands and roars

with pain and a sense of helplessness.

Graptolites, a group of fossil hydrozoa, apparently related to the recont Sertularia. They had simple or branched polyparies, formed of a chitineus substance, and the polyparies were usually strengthened by a horny-like rod, which is called the 'solid axis.' Professor Nicholson thinks that the term 'solid' is probably a misnomer, and that the term 'solid' is probably a misnomer, and that living material. The cellules in which the polypites lived were arranged in a single series on one side of the axis, or in a double sories on both sides; the axis was generally prolonged beyond the cells at the growing end of the polypary. Reproductive hads, or ovarian vesicles, have been observed attached to the polypary, exhibiting a method of reproduction similar to that in the hydrozoa, but they differ from the ovarian vesicles of the modern Sertularians in becoming detached from the parent colony. The graptolitos appear to have been free-floating organisms. They are generally divided into Monoprionidian and Diprionidian greups. In the first named the polypary, whether single or branched, had only one row of cellules, or 'hydrotheea;' in the second the polypary was mraished with a row of cellules on cach side. The former group ranges from the base te the top of the Silurian system, while the latter is confined chiefly to the Lower Silurian. To this system the graptolites may be said to be confined. Numerous species have been described, and from their abundance in the argillaceous shules and greywackes it is obvious that they must have swarmed in the Silurian seas. There are several other Sertularian-like fossils often described as graptolites; such as Dondrograprus—a rooted plant-like form (Cambrian and Lower Silurian); Dietyonema, alse plant-like, and probably rooted (Silurian); Retiolites, with no solid axis (Silurian), but otherwise resembling the graptolites.

Grasitz, a town of Bohemia, on the border of Saxony, 142 m. WNW. of Pragne by rail. Pop.

7609.

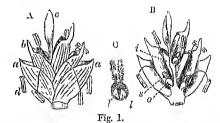
Grasmere, a Westmorland village, 4 miles NW, of Ambleside. There are four hotels. Pop. 684. Its antique cluurch is the church of the Excursion; and in the churchyard, washed by the Rothay, are the graves of Wordsworth and Hartley Coleridge. 'Grasmere's peaceful lake,' with its 'one green island,' lies \(\frac{1}{2} \) mile to the south, botween Loughrigg Fell (1101 feet) and Helm Crag (1299). Measuring 1\(\frac{1}{2} \) by \(\frac{1}{2} \) mile, it is 208 feet above sealevel, and 130 feet deep.

Grass-cloth. This name is sometimes given by travellers and missionaries to different kinds of cearse cloth, made by various savage races, the fibre of which is rarely that of a grass. Cloth is, or at least has been, made from Bamboo (q.v.), and a coarse matting is made from Esparto (q.v.), both of which are true grasses. A fine cloth is woven from the fibre of a species of Behmeria (q.v.), popularly called China-grass, but the plant is really a nettle.—To the nettle order also belongs the so-called Queensland Grass-cloth plant (Pipturus argenteus), which yields a fine, strong fibre.

Grasse, a town in the French department of Alpes-Maritimes, is situated on the southern slope of the Basses-Alpes, 1066 feet above sea-level, and 12 miles N. of Cannes hy rail. An ancient place, the seat of a bishopric from 1244 to 1801, it has steep, narrow, crooked streets, a cathedral, and an interesting latel-de-ville. Grasse is second only to Paris in its manufactures of essences and perfunes, made from the roses, orange-flowers, heliotropes, mint, &c., which, thanks to the mildness of the climate, are most successfully grown in the neighbourhood. It has also manufactures of olive-oil, silk, &c., and is growing in favour as a winterresort. Pop. 8254.

Grasses form the order Graminer, which with Cyperaeer (Sedges) makes up the second great division (Ghunacer) of Monocotyledons (q.v.). The first division (Petaloidere) consists of orders whose flowers are of the liliaceous or orchidaceous type; while the flowers of Ghunacer are best described as 'grassy.' The following characters are sufficient to distinguish grasses from sedges; grasses have generally cylindric or compressed jointed stems, usually with internodes becoming hollow; leaves afternate with sheath chasping the stem, but edges of sheath not joined; embrye at one side of the base of the endosperm (albumen). Sedges have generally triangular, sometimes cylindric, stems, jointed but solid; leaves in three vertical rows with leaf-sheath entire and forming a hollow cylinder round the stem; embrye within the base of the endosperm. The term 'grass' is often applied to any herbaceous plant that helps to form pasture, and agriculturists speak of natural and artificial grasses, the former only belonging to Gramineæ. Cereals (q.v.) and some pasture grasses are annual, but most pasture and woody grasses are perennial. Cereals and pasture grasses are herbaceous; bamboos are woody and may grow to a height of 100 feet in one season. There are 250 genera of grasses, and 3200 distinct species; ef these 41 genera with more than 100 species are natives of the British Isles, and fully 800 species and varieties within the limits of the United States.

Description.—The leaves are long and tapering, one being given off at each node of the stem; the leaf-sheath is a modified stalk, and is often prelonged upwards for a short distance beyond its junction with the blade, into a membrane or ring of hairs (ligule), which forms a collar nound the stem. The parallel veins of the leaves are continued downwards into the stem and anastomose only at the nodes. The stem (culm) at first consists of solid nodes and intornodes, but the internodes, except in sugar-cane and a few other tropical grasses, become hollowed out, and thus the



A, spikelet of wheat: a, glume; b, awn of outer bract; c, barren terminal flower; d, stanen. B, vertical section of same spikelet: o, ovary; s, stigna; i, inner bract. C shows position of todicules (l, l) in relation to the ovary.

stem is rondered comparatively lighter, and at the same time better able to resist the lateral pressure of the wind; because a cylinder offers more resistance to pressure than does a solid rod of the same weight and kind of material. The stems of grasses are further strengthened by impregnation with silica. Annual grasses have tufted, fibrous roots, but most grasses percunate by means of solid underground stems (rhizomes), from the nodes of which roots are developed; roots also grow freely from the lower nodes of the aerial stems of all grasses. The flowers are mostly hermaphrodite, as in barley and oats; maize and a few others are monecious; and some of the fescue trihe have the lower hermaphrodite and the upper male. Each flower is enclosed by two bracts (paleæ), which are the homologues of the two spathe-like bracts in the Inflorescences (q.v.) of Iridaceæ. The posterior bract is two-nerved, indicating its two-fold nature, and often clasps the fruit when mature; the anterior ('flowering glume') surrounds both, and sometimes bears an Awn (q.v.), as in barley. A number of flowers may be erowded together to form a spikelet; and, further, a number of such spikelets may be at-

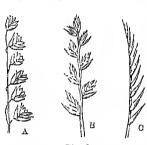


Fig. 2.

A, Molica nuturs; inflorescence a raceine of spikelets. B, Lolium peranne; a compound spike. C, Nardus strictu; spikelets reduced to one flower each.

tached by stalks to a central axis, forming a raceme, as in Melica nutans (fig. 2); when the raceme is loosely branched, the inflorescence becomes a paniele, as in Oats (q.v.); or the spikelets may be sessile on a central axis, forming a compound spike, as in ryegrass (Lolium). The spike may be looked on as a reduced raceme or paniele, in which

Nardus strictu; spikelets reduced panicle, in which the stalks of the spikelets have not been developed; each spikelet may again be reduced to a single flower, and then a simple spike like that of mat-grass (Nardus stricta) is the result. Beneath the lowest flowers of many spikelets there are two bracts (glumes) which may or may not bear barren flowers in their axils. There is no perianth such as is found in most inseet-pollinated flowers. Grass flowers are wind-pollinated and generally inconspicuous; in some, however, there are two or rarely three scales (lodicules) within the flower bracts; and these, from their position and relation to the other parts of the flower, may be regarded as segments of a

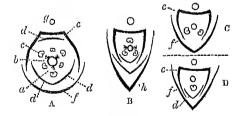


Fig. 3.

A, floral diagram of Bambusa (for explanation, see article FLOWDER): a, stigma; b, overy; c, stamen; d, ledicule; e, inner bract; f, outer bract; g, stem. B, Avena: h, glume; stamens reduced to three. C, Colcantius: ledicules awanting; two stamens.

D, Monandraira: one stamen.

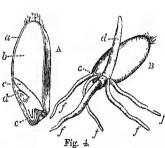
rudimentary perianth. These scales, becoming turgid at the period of sexual maturity, press the anterior bract outwards, and expose stigmas and stamens for pollination. Should wet weather occur when this stage is reached the powdery pollen may become clogged and kept from being blown about;

thus preventing fertilisation and the opportunity of producing seed.

361

Stamens vary from six or more to one; in British grasses usually three, but three to one in the fescue tribe. The slender filaments are inserted at the bases of the anthers, but the anther lobes grow downwards below the point of insertion, and the anthers appear to be, but are not, versatile. The overy is one-celled; there are three or two styles, with long and hairy, or short and feathery stigmas, which are thus enabled to eatch the windborne pollen. The fruit is one-seeded (caryopsis); the seed is adherent to the pericarp. The embryo by the great development of the farinaceous endosperm is dis-

placed to one side at the base of the base of the latter, its surface of contact being confined to that of a large process of disputed ho mology, the scutellum. When a grain of wheat or other grass begins to germinate, the sentellum acts as a placets as a placet as a placets as a placets as a placets as a placets as a placet as a place



A, grain of wheat in vertical section: a, pericarp; b, endospern; c, sentellum; d, young stem and leaves (plumule); e, flist toot (radicle). B, grain of wheat after germination has begun: f, secondary nots.

acts as a placental surface to the embryo, digesting the substance of the endosperm, and passing it on in a soluble state to the embryo, which soon begins to develop roots and leaves. When all the endosperm has been used up the seedling grass has put forth roots enough to draw a sufficient supply of sap from the soil, and green leaves to transform the sap into food materials for the tissues of the plant. The sentella of grains may be compared to the suckers (haustoria) of mistletoe, for it is by means of suckers that plant parasites fix upon, and draw sap from, their hosts.

means of success that plant parasites in upon, and draw sap from, their hosts.

Classification.—The order is divided into two divisions, the divisions into tribes, genera, and species. The genera are omitted here, and only the better-known species are given as examples.

(a) Panicae.—Spikelets articulate with the pedicels below the lowest glume, with a single terminal fertile flower, while the lower inferior is male or sterile.

7	Tilbe,	Examples.	
PANICE	Е	Panicum; Setaria.	
MAYDE	Æ.,,	Job's Tears (Coix); Maize (Zea).	
ORYZE.	C	Rice (Oryza); Cut Grass (Lecisia).	
TRISTEC	CINEAL	Arundinella.	
Zoyste	æ.,	Tragns.	
ANDROL	POGONEÆ	Sugar-cane (Saccharum); Durra (Andro).
		pogon); Millet (Sorghum).	
(6)	Poncere.	-Spikelets usually articulated above	e

the lowest glume, I- or many flowered; male or imperfect flower above the fertile ones.

Tille,	Lxunines.
PHALARIDEE	Reed Canary Grass (Phalaris); Sweet Vernal
	Grass (Anthoxanthum); Fox-tail Grass
	(Alopecurus).
AGROSTIDE.E	Millet Grass (Millum); Timothy Grass
	(Phleum); Bent (Agrostis).
AVENEÆ	Halr Grass (Aira); Soft Grass (Holous);
	Oats (Avena).
CHLORIDEÆ	Dog's-tooth Grass (Cynodon); Eleusine.
FESTUCEÆ	Read (Phragmites); Dog's-tail Grass (Cyno-
	surus); Cock's-foot Grass (Dactylis);
	Melie Grass (Melica); Quaking Grass
	(Briza); Poa; Feseue; Bromus,
HORDE E	Rye (Secale); Ryegrass (Lolium); Wheat
	(Triticum); Barley (Hordeum); Mat
	Grass (Nardus).
BAMBUSE E	Bambusa; Arundinaria.

Distribution.—Grasses are almost universally distributed on land, and are found at all elevations up to the snow-line, wherever there is soil. In temperate climates they form natural pastures, but in warm regions they are more tufted, and, like the sugar-cane and many bamboos, often attain a great height. The species of a single genus have often widely different habitats—e.g. Pout annua is a low-growing field-grass, while a closely allied species, P. aquatica, forms tall reed-like growths by the margins of rivers and lakes. The distribution of grasses in time dates from the Upper Eocene (a.v.) and subsequent formations.

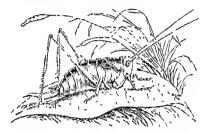
distribution of grasses in time dates from the Upper Eocene (q.v.) and subsequent formations. Uses.—The seeds of cereals furnish the principal material for Bread (q.v.) in most countries. By the process of malting, the starch of grains is converted into sugar, which is then allowed to undergo alceholic fermentation; Beer or Ale (q.v.) is made in this way fram barley, and from this liquor Whisky (q.v.) is obtained by distillation. Sugar is also obtained directly from the juices of some grasses—e.g. Sugar-grass (Sorghum saccharatum), unripe maize, and Sugar-cane (q.v.). Rum is the fermented and distilled liquor produced from the sugar of sugar-cane. Some grasses form Pasture (q.v.) and Fodder (q.v.). A few are medicinal, as Joh's Tears (Coix lachryma) (q.v.); the reeds, Phragmites anudanaeca, Calamagrostis, and Arundo Denax; and Conch-grass (Triticum repens), the rhizomes of which form a mild diuretic. Very few have poisonous properties. Darnel (q.v.) is held by some to be poisonous. Coldstroam (Grasses of S. Punjab) says: 'There is a curious fact regarding the qualities of Sorghum vulgare as food for eattle—viz. that in a dry season, before it flowers, the plant is poisonous to cattle. This poisonous quality is also shared by its congener, S. halopasse.' Some grasses are fragrant; Sweet Vernal Grass (Anthoxamhum oderatum) entains coumarine, a crystalline aromatic substance which gives the sweet seent to meadow hay. Some East Indian grasses are even more strongly seented, as Lemongrass (Andropogon citratum) and others of the same genus, which yield grass-oil. The woody stems of bamboos and other large grasses are applied to a great variety of economical purposes; and the straw of many of the smaller grasses is used for thatching, rope-making, plating, &c. (see Straw-Manufactures). Thus the fibres of the Moonja (Saccharum Munja) of India, the Esparto (q.v.) of Spain, and a few others are made into ropes, mats, sacks, and other coarse fabries. Paper is made in China from the young shoots of bamboo; and in most civi

See Parnell's 'British Grasses,' and 'Gramineæ' in Engler's Pftanzenfamilien. For classification, see also Boutham and Hooker's Genera Plantarum. The U.S. Department of Agriculture has published several valuable bulletins and monographs on American grasses, by Dr George Vasey.

Grasshopper, a name given to munerous insects forming the family Locustide, included in the order Orthoptera, and nearly related to Crickets (Gryllidæ) and Locusts (Acrididæ). It is unfortunately centusing that 'locusts' are not included in the family Locustide, and that one of our commonest grasshoppors is Locusta viridissima. It must be noted that in this article 'grasshoppers' mean the majority of Locustidæ. Whether grasshoppers are herbivorous or, as is oftoner the case, carnivorous, they usually live among vegetation, in woods and thickets or in the open field, kequing quiet during the day, but making the woodsides merry with their love 'songs' in the summer evenings. Most of them feed on flies and cater-

pillars, in catching which they use their powerful fore-legs, but many affect plants, and some combine both diets. During their conting season they may be seen flying even in the afternoon, but they are predominantly nocturnal and twilight insects. By their frequent green colour and yet subtler mimetic characters they are in many cases well concealed in their leafy haunts. The family is large and worldwide in distribution, but best represented in tropical and temperate regions.

In the grasshopper family (Locustidæ) the head is placed vertically; the slender antenne are longer than the body; there are hemispherical eyes, but rarely eye-spots; wings and wing-covers are generally present. The right (and occasionally also the left) wing-cover of the male bears posteriorly



Grasshopper, Female (Locusta viridissima).

a clear, round membrane stretched on a ring, which produces the well-known 'chirp' when set in vibration by the action of a serrated rilge on the under side of the opposite wing-cover. The left wing-cover is the bow, the right is the fiddle of the male grasshopper's music. There is usually a well-developed anditory organ at the base of the anterior legs. The females have a long ovipositor.

Sexually mature grasshoppers appear in late summer and autumn. The eggs are laid by means of the ovipositor either in the earth or in some dry stem. From these in spring larvae are developed, which are virtually like the adults, but moult at least six times before they become full-grown.

The Great Green Grasshopper (Locusta viridis-

The Great Green Grasshopper (Locusta viridissima), common in Europe, and occurring in Britain, has a body over an inch long. Equally large is Decticus variativorus, also British, which owes its specific title to the habit Swedish peasants have of making it bite their warts, which the secretion of a fluid from the month of the insect is said to affect favourably. Very common in Europe are Thannotrizon cinerous, Platycleis grisca, and other species. Among American grasshoppers Conocephatus ensiger, type of thoso with a conical forchead, is very common, as are also various species of Xiphidium and Orchehimmu. The nearly allied Katydids—e.g. Cyrtophyllus renewus and Microcentrum retinerois—will receive separate notice (see KATYDID). The tropical genus Copiophera is noteworthy for the length of its ovipositor, which somotimes attains a length of two inches, while Phyllophora and Phylloptera deserve monition for the exceedingly leaf-like appearance of their wingcovers. See Gricket, KATYDID, Locust.

Grass-moth (Crombus), a genus of small moths, allied to the Clothes-moths. The species, which are numerous, inhabit pastures, where they may be often seen to rise in great numbers when disturbed, and soen to settle again on the blades of grass. Their form, when their wings are closed, is long and narrow, pointed at the head, abruptly cut off at the opposite end. They are often brown and white, sometimes silvery and golden.

Grass of Parnassus (Parnassia), a genus of plants belonging to the natural order Saxifragueeu.

The popular and also the botanical names are founded on the myth that the best-known species (P. palustris) first appeared on Mount Parnassus, the abode of grace and beauty. The plant is a native of bugs and maist heaths in Britain and throughout northern Europe and Russian Asia, becoming a mountain plant in southern Europe and west central Asia. The ealyx is deeply 5-cleft, the petals white, 5 in number, and there are 5 perfect and 5 imperfect stamens, the latter bearing instead of authers a taft of 10 to 12 globular-headed hairs. There are several other species natives of Asia and North America.

Grass-oil, a name under which several volatile oils derived from widely different plants are grauped. The grass-oil obtained by distillation from the leaves of Andropogon waraneusa is used for rheumatism, and has the same stimulant effect as cajeput oil. Ginger-grass Oil is obtained from A. nardus, a nativo of India, and other species of the same genus. Geranium Oil, derived from Pelaryonium radula, is so like ginger-grass oil in its properties that they are used for the same purposes, and are bought and sold under either name, mainly as an adulterant of Oil of Rose. Thrkish Grass-oil is obtained from A. pachnodes, indigenous to India, Persia, and Arabia. Lemon-grass Oil, or Citronella Oil, is derived by distillation from A. schamanthus, indigenous to India and eultivated in Ceylon. It has an odour resembling oil of citron, and is largely used for seenting soap. Cyperus-grass Oil is extracted from the tubers of Cyperus esculentus, indigenous to sonthern Europe, and is used both as a table oil and in the manufacture of soap.

Grass-tree (Xanthorrhau), a genus of plants of the natural order Liliaeea, natives of Australia, and constituting a very peculiar feature in the vegetation of that part of the world. They have shrubby stems, with tufts of long wiry foliage at the summit, a long cylindrical spike of densely aggregated flowers shooting up from the centre of the tuft of leaves. The base of the inner leaves of some species is catable, and forms, particularly when roasted, an agreeable article of food. It has a balsamie taste; and all the species abound in a resinous juice, which, on exposure to the air, hardens into a reddish-yellow inodorous substance with a shuing fracture, soluble in alcohol, and nseful as a tonic in dysentery, diarrhaa, and other intestinal maladies; used also by the natives of Australia for uniting the edges of wounds, and with an aluminous earth for caulking their canoes, and as a cement for various purposes.—The Common Grass-tree (X. hastilis) has a stem about four feet high, but sometimes a foot in diameter. It is of very slow growth, and is supposed to be many centuries old when it has reached such dimensions.—Several species are found in castern Australia and also in New Zoaland, where their leaves are used as fodder for all kinds of cattle.

Grassum, in the law of Scotland, is a lump sum paid by persons who take a lease of landed property. 'Rent,' says Bell, 'is naturally periodical, but sometimes part is paid in anticipation in grassum. And so grassum is, when analysed, a proportion taken from each year's rent, and paid at once by anticipation, either to supply some necessity for ready money, or to disappoint some future possessor of the estate.' In England the words 'premium' in some cases, and 'fine' in others, mean the same thing.

Grasswrack (Zostéra), a genus of plants of the natural order Naiades, one of the few genera of phanerogamous plants which grow amongst seaweeds at the bottom of the sea. The leaves are narrow and grass-like, and the flowers consist

merely of stamens and pistils, without any perianth, inserted on the central nerve of one side of a flat thin linear spadix, with a leafy spathe. The pollen is confervoid.—The Common Grasswack (Z. marina) is a perennial plant, which forms green meadows on the sandy bottom of shallow parts of abnost all the Enropean seas, and abounds in creeks and salt-water ditches. It is found in great plenty on the British shores. It becomes white hy exposure to the air. The rush-like coverings of Italian liquor-flasks are unde of it: it is much used for packing glass bottles; and it serves well for thatch. Cattle eat it as forage; it is burned to obtain soda, and has been employed in the manufacture of paper. It has been long used in Holland, Iceland, and clsewhere for stuffing pillows and mattresses; and this use has of late years very much extended, so that the plant has become an article of commorce, under the name of Alga marina, or more commonly, but incorrectly, Alva marina (Ger. Sec-gras).

Grate. See WARMING.

Gratian, a Benedictine monk, who at Bologna between 1139 and 1142 compiled the *Decretum* Gratiani. See CANON LAW.

Gratianus, Augustus, Roman emperor from 375 to 383, was the eldest son of Valentinian I., and was born at Sirmium in Pannonia in 359. At nine he was elevated by his father to the rank of Augustus at Ambiani, or Amiens, in Gaul, and next year accompanied him in his expedition against the Alemanni, in order to learn the art of war. On the death of Valentinian the troops elevated Gratian to the throne, giving him at the same time as a colleague his half-hother Valentinian II. Gaul, a colleague in shalf-mather valentuman II. Gaul, Spain, and Britain fell formally to Gratian's share, but as his brother was only four years old he virtually ruled also over the rest of the western empire, fixing his residence at Trevini (Trèves). At first he showed vigour in repelling the incursions of the turbulent barbarians, and suddenly found himself in 378, on the defeat and death at Adrianophe of his nucle Valens at the hands of the Gaths, sovereign also of the eastern empire. the Goths, sovereign also of the eastern empire. Finding himself inadequate for the task of ruling the whole empire, he recalled Theodosins from Spain, and appointed him his colleague on the 19th January 379. Gratian possessed some admirable virtues: he was pious, chaste, temperate, and eloquent; but his character was too pliant, and he was often led to commit gress acts of ernelty and tyranny. His persecution of the pagans, and afterwards of heretic Christians, made him a great favourite with orthodox ecclesiastics, but rather alienated the affections of his subjects generally; while his fordness for frivolous anusements and unworthy associates excited the contempt of the army, so that when Maximus was proclaimed emperor by the legions in Britain crowds of the disaffected flocked to his standard. Gratian was defeated by him near Paris, and afterwards fled to Lyons, where he was overtaken and put to death, 25th August 383.

Grati'ola, a genus of plants of the natural order Scrophularinee. G. officinalis, sometimes called Hedge Hyssop, is found in pastures in most parts of Europe. It is extremely bitter, acts violently as a purgative, dirretic, and emetic; and in overdoses is an acrid poison. It was formerly so highly esteemed as a modicine that the name of Gratia Dei ('Grace of God') was given to it, and for the same reason it is known in Franco as Herbe au Pauvre Hommo ('Poor Man's Herb').—G. peruviana, a South American species, has somewhat similar properties. Those properties are supposed to depend upon a bitter resinous principlo called Gratiolin.

Grattan, Henry, one of the greatest of Irish patriots and orators, and, like Curran, Flood, Isaac Batt, and Parnell, a Protestant, was born in Dublin, July 3, 1746. His father was recorder of the city, and one of its members from 1761 till his death in 1766; his mother was daughter of Thomas Marlay, Chief-justice of Ireland, one of whose sons lived to become Bishop of Waterford. At seventeen he entered Trinity College, Dublin, and here gave himself with remarkable eagerness to the study of classics. Already Henry Flood had been forming a regular party of opposition in the Irish Hanse of Commons, and young Grattan embraced his reforming principles with such impolitic ardour that his irate father disinherited him from such property as he could alienate. At twenty-one he entered the Middle Temple, Loudon, and read law in a desultory fashion, nonrishing his peculiar ambitien the while by listening to the delates in the Honse of Commons and by constantly declaiming in set terms to imaginary audiences in the privacy of his chamber. In 1772 he was called to the Irish bar, and three years later, through the influence of the genial and enlightened Earl of Charlemont and by the advice of Flood, entered the Irish pulliament as member for the borough of Charlemont. It was but two months before that Flood had thrown away his popularity by accepting office under government, and the young orator leaped at one bound into his place. He found the nation fast drifting to bank-mptcy and rain from the lass of market that followed the war with America, and the odions restrictions upon Irish trade that had come down from the days of William III.; and he at onee fitung himself with all the vehenence of his nature into the cause of retrenchment and reform.

Meantime, in the dread of French invasion, the volunteer movement spread from Belfast over Ireland, and ere long the attitude of the people in their demand for free export became so formidable that Lord North, whose own inclinations had formerly been thwarted by the interested opposition of the English manufacturers, granted in 1779 a total repeal of all the restriction acts. This gained, Grattan plunged into a greater struggle for nothing less than legislative independence. On the 19th April 1780 he made perhaps his greatest speech, concluding with a memorable series of resolutions to the effect that while the crown of Ireland was inseparably annexed to that of England, the king with the consent of the parliament of Ireland was alone competent to enact laws to bind Ireland. After fifteen hours the debate was adjourned indefinitely, but all men felt that Grattan had gained a great moral victory. The popular demands were formulated at the Convention of Dingannon (February 15, 1782), and asserted by Grattan in a famous speech (April 16), which began with the words, 'I am now to address a free people.' A month later the Rockingham ministry, which mumbered among its members Grattan's friend Fox, surrendered apparently unconditionally, and the Irish parliament in gratinde voted Grattan a reward of £50,000. Unfortunately the question was soon raised whether the mere repeal of the Declaratory Act (6 Geo. I. chap. 5) was sufficient as a renunciation of the principle of England's right to legislate for Ireland. Grattan wished his countrymen to trust to the generous instincts of English honour, and accept the gift without factions wrangling about the manner of its giving, but Flood put himself at the head of the malcentents, demanding 'simple repeal' and renunciation rather than concessions granted merely to the exigency of the moment. He carried the mass of his countrymen with him, and what was perhaps the historie moment for

the reconciliation of England and Ireland was lost. The quarrel between the two leaders enlminated in one dramatic scene on the floor of the bonse, when Grattan overpowered his antagonist with a tornado of rhetorie that has perhaps never been surpassed for the ruthless energy of its invective

surpassed for the ruthless energy of its invective.

The history of 'Gruthan's parliament,' as it has deservedly been called, did not correspond to the patriotic dreams of its great founder. It was impossible for a parliament so little really representative and so much subject to corruption and midue influences from without to rise into the region of real statesmanship. In his ideas about the rights of his Catholic fellow-countrymen Grattan was far more advanced than most of his own followers. Apart altogether from the fact that the Roman Catholics, comprising twe-thirds of the whole population, were entirely without representation; out of a house of 300 members no fewer than two-thirds were nominated by but a hundred pations. The argent nced of parliamentary reform and the remedy of domestic abuses soon occupied the minds of all hish patriots, the high-minded and the self-seeking alike. Once more at Dungamum there assembled on September 8, 1783, as many as 500 delegates to formulate the demands for parliamentary reform, which were presented to the house by Flood and rejected, while Grattan looked on in a kind of nentrality that was perhaps a consequence of the recent quarrel. He devoted himself to advacating the reform of special abuses, but his Place and Pension Bill, as well as his bills to prevent revenue officers from to absentees, and for the commutation of ecclesiastical tithes, were in turn rejected.

Meantime continued commercial depression had produced a strong counter-feeling in Ireland for protection, which was yet unable to prevent the Secretary Orde's remedial measure for absolute free trade from being carried. This measure, however, Pitt found himself unable to carry in the English House of Commons, except subject to a number of stipulations, one of which was that all English navigation laws now and hereafter were to be adopted as such by the Irish purliament; and to this Grattun and the Irish patriots found themselves unable to accede, as an outrage upon the freedom of the Irish partia-ment. Pitt's mortification at this and his displeasure at the independent attitude of the Irish parliament in the regency dispute of 1789 helped to confirm his determination that union was the only effective means of final pacification. Grattan was roturned for the city of Dublin in 1790, and by this time he had definitely taken up the cause of Catholic emancipation. The corruption of the Castle government and of a parliament venal he-yond all precedent; the persistent repression of the agitation for Catholic relief, changed for a moment into hope at the appointment of Fitzwilliam as Lord-lientenant, only to be dashed to the ground again by his withdrawal; and the spirit of dis-content generated by the French Revolution that was now everywhere in the nir had fomented the movement of the United Irishmen, which was to be extinguished in the bloodshed of 1798. Hopeless of his country and broken by ill-health, Grattan retired to his house at Tinnchinch on the eve of the rebellion, but returned to take his scat for Wieklow in the last session of the frish parliament. Weak as he was he fought the bill for the Union with an heroic courage that would have avercome everything but the gold and the coranets of Pitt, pouring his showers of invective upon the head of Corry the Chancellor of the Exchequer, who retorted with a challenge, and in the duel was wounded in the arm, Once more Grattan retired to private life, from which he emerged in

1805 as member for Malton in Yorkshire, and for Dublin the following year. His first speech in the English House of Commons fully sustained his oratorical reputation. It contained the well-known passage about the Irish parliament: 'Of that assembly I have a parental recollection. I sat by her cradle; I followed her hear-e. The remaining energies of his life were devoted to the cause of Catholic enuancipation, which he reiterated was the price of the union, apart altogether from the intrinsic justice of the demand. 'A great majority cannot overcome a great principle. God will guard bis own cause against rank majorities. In vain shall men appeal to a church cry, or to a mock thunder; the proprietor of the bolt is on the side of the people.' Instead of one-sided 'securities' he demanded from his opponents adequate reasons for their opposition—'some apology to after ages for inflicting on one-fourth of their fellow-subjects political danmation to all eternity.' Despite all his eloquence and the support of Cauning and other statesmen, he was not to see triumph in his lifetime. In December 1819 his health began finally to give way; but as he grew weaker his responsibility to this question weighed the more upon his mind. On the 20th of the following May he crossed from Dublin, a dying man, to speak once more for the cause, and, unable to hear the motion of a earriage, was carried to London from Liverpool by canal. But his voice was never to be heard again. A day or two after his arrival he sank, a prayer for his country on his lips, June 4, 1820. He was builed in Westminster Abbey beside the grave of Fox.

Grattan's figure was small and spare; his face long, thin, and slightly marked by smallpox. His gestures in speaking were violent and eccentric, and his voice of no great volume, yet he wielded his listeners at will by his energy and passion, his overpowering earnestness and enthusiasm. He was a consummate master of epigram, and few orators have had his rapidity and vigour. His description of Flood as standing 'with a metaphor in his mouth and a brihe in his pocket,' is lint one among a hundred phrases that will never be forgotten. His patriotism was enlightened and incorruptible, and

his honour remains without a stain.

ms nonour remains without a stain.

The best collection of his *Speeches* is that made by his son, Henry Grattan, M.P. (4 vols. 1822), who also edited in the same year his *Misocilaneous Works*. The standard Life is also that by his son (5 vols. 1839-46), but this is far from being a satisfactory work. See also the sympathetic essay in W. E. H. Lecky's *Leaders of Public Opinion in Ireland* (2d ed. 1872); and the excellent study in the 'Statesmen' series, by Robert Dunlop (1889).

Gratuitous Deed, in the law of Scotland, means a deed granted without any value received. Such deeds, if made after the contracting of debt, and in favour of a near relation or confidential friend, are presumed to be fraudulent and so null. In England gratuitous deeds are usually styled (lifted or v) Gifts (q.v.).

Gratz, or GRAZ (formerly Gratz), the capital of Styria, in Austria, 141 miles SSW. of Vienna by rail, is a picturesque old town with four suburbs, built on bath sides of the Mur, and encircled by fine gardens and pleasure-grounds. Of the former fortress, erected on a hill in the centre of the town, and dismantled in 1809 by the French, two towers and other remains still exist. The town itself contains several old buildings, as the Late Gothie calhedral (1402), two other Gothie churches (one built in 1283), the ancient castle of the Styrian challent the Taylors where the styrian contains the styri dukes, the Landhaus, where the nobles of the duchy held their meetings, the university, originally founded in 1586 (with 1134 students in 1885, and a library containing 120,000 volumes), an armoury,

palaces of the Styrian nobles, and four monasteries dating from the 16th and 17th centuries. There are also national archives, a cabinet of coins and are also national archives, a cabinet of coins and antiquities, a technical school (Johannenn), a second library of 70,000 volunes, and a botanic garden. The most important of its many industries are the manufacture of machines, steel goods, rails and railway carriages, sugar, wine, perfumery, stearine candles, soap, &c. Pat capons, hiscuits, and chocolate figure prominently as articles of trade. Gratz is a favourite place of residence for Austrian officials retired from service. Pop. (1880) 97,791, including a garrison of 5000 men. The town is mentioned in the annals as early as 881. In 1481 it repulsed the Hungarians from its walls, and in 1532 the Turks. In 1797, and again in 1809, it was occupied by the French. In the vicinity are several hydropathic establishments and holiday resorts. See Ilwof and Peters, Geschichte und Topographie der Stadt Gruz (1875).

Granbtinden. See Grisons.

Grandenz, an old town in the province of West Prussia, on the Vistala, 37 miles N. of Thorn. It carries on a trade in corn, wool, and tatles, and has irou-foundries, breweries, and tapestry and cigar maunfactories. Pop. (1875) 14,553; (1885) 17,336. About a mile north of it on a hill (282 feet) it the fortress of Graudenz, built in 1776, and successfully defended against the French in 1807. It was maintained as a fortress till 1874, and now serves as a barrack and military prison. Pop. 2072.

Granwacke. See GREYWACKE.

Gravel, the name given to aggregations of water-worn and rounded fragments of rocks, varying in size from a pea to a hen's egg. When the fragments are smaller, the deposit is sand; when larger, it is called shingle. Beds of gravel eccur in formations of every age. While the materials have been always time in claim approach and have larger, it is cance smage. While the materials in formations of every age. While the materials have been a long time in being prepared, and have travelled perhaps a great distance from the mother-rock, gravel deposits have been formed speedily and by the action of a strong current of water. They form very irregular and limited deposits, occurring generally as banks or hummocks in strata of sand. Unless in the most recent deposits, they almost always form a hard rock called conglomerate or puddingstone, the pebbles being compacted together by some infiltrated cement, either calcareous, ferriginous, or siliceous in character. Even recent gravels are sometimes formed into a compact concrete, though these and later deposits are generally loose. The stones of a gravel or conglomerate may be fragments of almost any kind of rock; lut the harder species are the most common—publics of quartz and quartzite forming as a rule the chief material in gravel-beds of all ages. In our own day gravel and shingle are formed both by fluviatileand marine action, and the same was the case in the older periods of the earth's history. Thus-certain conglomerates mark out for us the sites of old sea-coasts, while others represent old river-beds.

Gravel varies much in character and appearance according to the formation from which it is derived. In the making of reads and walks, particularly in gardens, pleasure-grounds, and public parks, it is the last ingredient used. Essential qualities in a good gravel are (1) that it should be binding—that is to say, it should not shift like sand under foot; (2) it should be durable; and (3) its colour should be agreeable to the eye and in harmony with vegetation. It is rare to find a gravel in which all these qualities are combined. The only sort known in Britain to possess them all in itself is the famous Kensington gravel, which has long been regarded by landscape-gardeners at home and on the Continent as the most perfect natural walk or

road-finishing material obtainable anywhere. a pit-gravel, and abounds in oxide of iron, to which to twee its binding quality and also its fine warm harmonious colour. Many other pit-gravels also possess this cohesive property in a high degree, but are defective in colour. As possessing better binding properties, pit-gravels generally are to be preferred to sea or river gravels; but their defects of colour often preclude their use in landscapedifficult to precure one in the interest paralleling. The Kensington gravel is costly and difficult to precure. On this account, and also because of its similarity in colour, the most popular gravel of the present time is the Dorset Peu; but it is also one of the present. gravel of the present time is the Dorsal Fea; but it is also one of the most shifting, the flinty pebbles composing it being round and about the size of a pea. As the name implies, this sort comes from the coast of Dorsetshire. From the shore of the neighbouring connty, Hampshire, is obtained another pleasingly coloured flint-gravel named the Lymington; and the Sussex coast furnishes two sorts named Sussex Pea and Sussex Boan. The preparation form of the former is neadlike that of the prevailing form of the former is pea-like, that of the latter bean-like; hence their respective names in commerce. They are found commingled on the shore, and are separated by sifting. Shell-gravel—so called because composed of minute shells entire or the fragments of larger ones-is also a favourite gravel, being pleasing in colour and com-fortable to walk upon when not laid on very deep. It is found on various parts of the British coasts and on those of the Channel Islands. Musselburgh gravels—both share and pit—are prized in that district, being good in colour, and the pit variety has also fair binding properties. There are many manufactured gravels, such as granite, whinstone, purely a construction of the character of the c marble, quartz, slag, glass, &c., which are crushed in machines, and afterwards riddled to the desired sizes. These and all the sea and river gravels are used in making asphalt and other composite roads and paths, some of them when skilfully combined with cement imparting a very beautiful appearance to the surface.

Gravel, a disease. See CALCULUS.

Gravelines, a fortified town in the French department of Nord, is situated in a marshy locality at the mouth of the Aa, 13 miles by rail ENE. of Calais. A desolate-looking place now, with grassgrown streets, it has an historic past, as the seene of Egmont's victory over the French (1558), and the place off which the English dispersed the Armada (1558). It was taken by the French in 1644, retaken by the Austrians after a ten weeks' siege in 1652, and finally recaptured in 1658 by Louis XIV., who had it fortified by Vauban, Pop. (1872) 4391; (1886) 2228.

Gravelotte, a villago of Lorraine, 7 miles W. of Metz. There, on 18th August 1870, the French under Bazaine sustained a severe defeat by the Germans. See France, Vol. IV. p. 783.

Graves. See Barrow, Burial, Churchyand, Cemetery, Monuments.

Graves, Robert James, physician, who did much to raise the status of his profession in Ireland, was born in 1797, the youngest son of the Dean of Ardagh. He studied medicine at Duhlin, and after taking his degree visited the medical schools of London, Göttingen, Berlin, Copenhagen, those of France and Italy, and Edinburgh, and on his return home settled (1821) in his native eity as a private practitioner and a teacher of medicine, especially distinguishing himself by the introduction of improved methods of clinical study. In 1827 ho was appointed professor of the Institutes of Medicine in the College of Physicians, Dublin, of which college he was chosen president in 1843 and 1844. He was elected a Fellow of the Royal Society in 1849. Many of his most remarkable

papers appeared in the Dublin Journal of Medical Science, which was founded by him in 1832. Dr Graves died on 20th March 1853. He published A System of Clinical Medicine (1843) and Clinical Lectures (1848). After his death his Studies in Physiology and Medicine was issued in 1863 by Dr W. Stokes. See Dublin University Magazine, 1842.

Gravesend, a port and borough of Kent, on the right bank of the Thames, 24 miles ESE, of London. It consists of the old town, with narrow, irregular streets, and of the handsome new town on the high ground. In the vicinity are extensive market-gardens; and many of the inhabitants are employed in fishing. Gravesend forms the limit of the port of London; and here pilots and custom-house officers are taken on board of vessels going up the river. For centuries the prosperity of the town has depended on its connection with the metropolis. The salubrions favorate watering-place with Londoners. It earnessen some shipbuilding, iron-founding, soap-making, and brewing, and a considerable trade in supplying ships' stores. Gravesend was incorporated under Elizabeth, and since 1867 has returned one member to parliament. Pop. (1861) 24,525; (1881) 31,283, of whom 23,302 were within the numerical boundary. Gravesend was originally a hythe, or landing-place, and is mentioned as such in Domesday. Around this landing-place a town grew up soon after the Conquest. Here the fleets of early after the Conquest. Here the fleets of early voyagers, as that of Sebastian Cabot in 1558, and of Martin Frobisher in 1578, assembled, and here the lord mayor, aldermen, and city companies of London were wont to receive all strangers of emineneo, and to conduct them up the river in state. A great fire in 1850 did damage to the amount of £100,000. See Arden's History of Gravesend (1843).

Gravina, a town of sonthern Italy, in the centre of a rich agricultural district, 33 unles SW. of Bari. Pop. 15,612.

Graving-dock. See Dock.

Gravitation. It is a matter of common experience that all unsupported bodies near the surface of the earth fall to the ground, the direction of their motion being towards the earth's centre. The modern explanation of this phenomenon is that it is due to an attractive force termed gravitation or gravity, which exists between any such body and the earth, in virtue of which they tend to move towards one another. The motion of the earth and other planets round the sun, and of the various satellites round their primaries, may be explained on the same ground. The mode of action of this force is given in the following generalisation, first explicitly given by Newton, and known as the Law of Gravitation: Every particle of matter in the universe attracts every other particle with a force whose direction is that of the straight line joining the two, and whose magnitude is proportional directly as the product of their masses, and inversely as the square of their mutual distance.

Previous to Newton's investigations, Kepler,

Previous to Newton's investigations, Kepler, by a truly proligions amount of labour, had deduced from the observations of Tycho Brahe the following kinematical laws of planetary motion:
(1) The path of each planet is an ellipse, of which the sun occupies one focus; (2) the radius-vector (i.e. the straight line which joins the centre of the sun to that of the planet) of each planet describes equal areas in equal times; (3) the square of the periodic time (i.e. the time during which a planet makes one complete revolution round the sun) of each planet is proportional to the cube of the major axis of its elliptic orbit. From the second of these

deductions Newton showed that if the sun attracts the earth or other planet, the direction of this attractive force must be in the line joining their centres; from the first and third he proved that its intensity must be inversely proportional to the square of their mutual distance (so that at double that distance the intensity of attraction would be one-fourth; at three times the distance, one-ninth; and so on). Lastly, the proof that the attraction is proportional to the product of the masses is found in the fact that the weight of any body is under all circumstances proportional to its mass. To test the truth of his deductions, Newton studied the motion of the moon round the earth, and found that this satellite is retained in its orbit by an attraction which is exactly the same as that which causes a body near the earth's surface to fall with an acceleration of (about) 32.2 feet per second.

It must, however, be remembered that Kepler's

laws are themselves only approximately true, owing to the attraction of one planet on another interfering with what might be termed the ideal state of things, and thus producing those small superposed motions of a planet which astronomers that the confirmatory proofs of the law of gravita-tion are found; for not only are all these perturba-tions completely explained by its means, but they have also been discovered and measured by it.

The action of gravitation is independent of the nature of matter, thus differing from magnetic attraction, which is only found in a restricted class of bodies. At the same time the manner in which magnetic and also electric attraction depends upon distance is the same as gravitation. Gravitation is not affected by the presence of other matter; in other words, the weight of a body is the sum of the weights of its parts.

The intensity of gravity at the earth's surface is measured by the acceleration of a body falling freely under its influence; it is usually denoted by g. It is found, from pendulum experiments, to vary slightly with the latitude, and also with the licight above scalevel of the observing station. For any locality in the British Islands it is, however, little different from 32.2 feet per second. The following table gives the value of g for several places in the northern hemisphere:

Station.	Latitude,	Value of # In feet per second.
Equator	O° 0′	32.001
Paris	43° 50′	32.183
Greenwich	51° 29′	32.101
Berlin	52° 30'	82.194
Dublin		32.196
Manchester		32'196
Edinburgh	55° 27′	32.203
Aberdeen	57° 9′	32.206
North Pole		32.255

From these figures it will be seen that a body apparently gains weight as it is carried from the equator to higher latitudes. This is due to two causes. First, owing to the ellipsoidal shape of the earth, gravitational attraction at the poles is the centrifugal force of the earth's axial rotation, bodies at the equator are the roles, where this cause does not affect their weight. These two fractions together make up the difference of the third poles, where this cause does not affect their weight. ence, Tot, between equatorial and polar gravity. The fraction denoting diminution of weight due to the centrifugal force of the earth's rotation, may be employed to find at what speed the earth would need to revolve in order that gravity would just be balanced by 'centrifugal force.' It is found that, to fulfil this condition, the earth would require to revolve at seventeen times its present speed; when revolving at this rate bodies would not have any tendency to remain on the earth's surface, and with

an increased speed they would be projected into space. Taking also into consideration the diminution of gravity with increase of height, the value of terrestrial gravity is expressed by the formula $g=32\cdot173-082\cos2\lambda-000003\,h$ where λ is the latitude, and h the height, in feet, above sea-level. It must be remembered that this value of q is different from that which would be obtained were there no axial rotation of the earth; under the latter circumstances, the value of gravitational attraction alone would be $g=32\cdot525-026$ cos 2 λ .

To account for the phenomenon of gravitational attraction several flieories have been advanced; but in spite of the best efforts of mathematicians and physicists, the real cause remains undiscovered. Nor is there any physical reason in evidence of the truth of the several assumptions upon which these theories have been based. As Clerk-Maxwell has pointed out, their chief value lies in their suggestiveness, and in there being an incentive to the deeper and more prolonged research after possible causes for gravitation. The earliest speculations on the subject were, of course, almost wholly metaphysical, and therefore misleading, if not absolutely erroneous. To begin with, the assignment of an attraction between the earth and sun as the cause of the earth's motion was set down as being impossible, on the plea that a body could not act in the place where it was not. Again it was urged that such a cause would be simply 'action at a distance,' and hence impossible. Newton's only speculation on the subject showed that he looked to some intervening medium as the agent by means of which attraction between bodies was exerted; that if bodies rarefied this medium round them at a rate lessening as the distance increased, gravitational attraction might thus be accounted for. Another hypothesis, and one of an entirely novel kind, was put forward in 1818 by Le Sage. He presupposed that space contains an exceedingly large number of small bodies moving rapidly in all directions. To these bodies he gave the name of ultranundane corpuseles. They would impinge upon any single isolated body in space in all directions, the result heing that the body would not be moved, the impacts being equal on both its sides. But with two bodies in space, one would some the other from a contain number of bloors or screen the other from a certain number of blows, so that on their opposed faces there would be a fewer number than on their distant faces; in consequence of this excess of impacts on one side over those on the other, each body would tend to move towards the other. The attraction between the two would be inversely as the square of their distance, and proportional to the surface of the bodies resolved normally to the line joining their centres. So that if muss be proportional to surface, there should be coincidence between the results of the hypothesis and the observed law. The chief objection to this hypothesis is that it would require not only that the corpuscles be infinitely small compared with the molecular distances in ordinary matter, but that they move at a speed enormous compared with anything we are acquainted with. Moreover the amount of energy required to maintain the gravitational attraction of a comparatively small body near the earth's surface would, if converted into heat, be sufficient to raise the earth to the tomperature of incandescence. Sir William Thomson has shown that gravitation might be explained by the assumption of the existence of an incompressible fluid filling all space, being either created in each particle at a rate proportional to its mass, and flowing off everywhere to an infinite distance; or by each particle absorbing a quantity proportional to its mass, the supply coming in all directions from an infinite distance. Another method of accounting for gravitation is that of

Clerk-Maxwell, who showed that if in a medium, such as that of the luminiferous ether, there be pressure along, and tension at right angles to the lines of force, the effect would be an attraction such as that of gravitation. The main objection to all these proffered hypotheses is that they presupposed the existence of quantities of energy in the universe which are absolutely enormous compared with the effects they produce; or, at all events, postulate some cause working not in accordance with the known laws of energy.

Gravity, Specific. See Specific Gravity.

Gray, a town in the French department of Hante-Saône, on the Saône, which is here crossed by a stone bridge of the 13th century, 25 miles NW. of Besancon. It has remains of an aucient castle of the dukes of Burgnmly, some trade in corn, flour, and iron, and iron-industries and boatbuilding. Pop. 6737.

Gray, Asa, an eminent American botanist, born at Paris, Oncida county, New York, November 18, 1810. He took his degree of M.D. in 1831, but soon reliaquished the practice of medicine, and devoted himself to his favourite study of botany. In 1834 he received the appointment of botanist of the United States exploring expedition to the sonthern seas; but, as a long delay tank place before it was ready to sail, he resigned his post in 1837. He was afterwards elected professor of Botany in the university of Michigan, but declined the appointment, and in 1842 became Fisher professor of Natural History at Harvard. In 1873 he retired from the chair, but still retained charge of the great herbarium he had presented to the university in 1864; and in 1874 he succeeded Agassiz as a regent of the Smithsonian Institution. Ho ranks among the leading lotanists of the agn. His numerous writings evince equal ability in communicating elementary knowledge and in clucidating recondite theories. He came forward at a time when the old artificial systems of botany were giving way to the natural system which has taken their place, and he was the first in America, in conjunction with Dr John Torrey, to arrange the heterogeneous assemblage of species upon the natural basis of affinity; and he became an influential supporter of the Darwinian theories of evolution. In 1838 he commenced, with Dr Torrey, the Flora of North America; and in 1848-50 appeared the Genera Florae Americae Bareal-Orientalis Illustrata. Among his remaining works may be mentioned, besides menuirs on the botanical results of several government explaring expeditions, and a number of text-books that have long been in general use in the United States, A Free Ecanimation of Darwin's Treatise (1861), Darwinia (1876), and Natural Science and Religion (1880). He died 30th Jannary 1888. A selection from his scientific papers was published in 2 vols. in 1889. Ho was a member of the principal learned societies of both America and Enrope, to whose transactions and to scientific p

Gray, DAVID, a minor poet, was born 29th January 1838, at Duntiblae, on the south side of the Luggie, about 8 miles from Glasgaw. He was the eldest of the eight children of an industrious weaver, who gave him as good an education as he could at the Normal School and university of Glasgow, in the hope of making him a Free Church minister. But the boy began early to write verses, and seems to have made from the beginning an enormously exaggerated estimate of his own promise. In May 1860 he started for London along with Robert Buchanan, with the usual lofty hopes, and quickly met the usual discouragements. He made an appeal to Monekton Milnes, afterwards

Lord Houghton, who found him some employment, but failed to get his poems printed. Meantime consumption seized him, and a stay in Devonshire, for which Milnes, Sydney Dobell, and other friends had found him the means, proving useless, he went home to his parents at Merkland, a mile from Kirkintilloch, to die. The end came quickly, 3d December 1861, but the day before he had had the happiness to hold in his haml a specimen page of the volume of his poems in print. The volume was entitled The Luggie and other Poems (1862), and was prefaced by an introduction by R. Monekton Milnes and a memoir by J. Hedderwick. His latest work was his best, and, indeed, the somets grouped together here under the title 'In the Shadows' are stamped with a solemn and touching beauty of their own. An enlarged edition, edited by Sheriff Glassford Bell, appeared in 1874. See also R. Buchanan's too high pitched essay, in David Gray, and other Essays (1868).

Gray, ELISHA, an American inventor, was born at Barnesville, Ohio, 2d Angust 1835, and studied at Oberlin College, meanwhile supporting himself by working as a carpenter. He was afterwards engaged in the manufacture of telegraphic apparatus. His patents number about fifty, including several for the speaking telephone, of which he claims the invention, and others for a multiplex telegraph, by which he has succeeded in sending eight messages at a time.

Gray, JOHN EDWARD, English naturalist, born at Walsall in 1800, was educated for the medical profession. After assisting his father, author of Supplement to the Pharmacopaia, in the preparation of his Natural Arrangement of British Plants in 1821, he entered in 1824 the British Museum as assistant in the Natural History Department, and in 1840 was appointed keeper of the Zoological Collections, a post which he retained till 1874. A few months later, on 7th March 1875, he died in London. To him belongs the merit of having made the zeothin belongs the inert of the Hritish Aluseum the most complete in the world. Dr Gray wrote much on subjects connected with his department. The titles of his books and papers number more than 500. Of these the most important are his catalogues of the British Museum collections, which are not more lists, but are enriched with synonyms and ample notes. Next to these come Illustrations of Indian Zoology (1830-35) and The Knowsley Menageric and Aviary (1846-60). Dr Gray also assisted in the fermation of some of the most prosperons scientific societies of London, and was a vice-president of the Zuological Society.—His wife, Marka Emma, wrote Figures of Malluscous Animals for the Use of Students (5 vols. 1842-57).—His brother, (FEORGE ROBERT (FRAY (1808-72), an officer in the Zoological Department of the British Museum from 1831 bill his death, is known as author of *The Genera of Birds* (1849), and of works on the birds of Polynesia and New Guinea.

Gray, Thomas, one of the greatest of English poets, in value if not in bulk, was born in Corabill, London, 26th December 1716. His father, Philip Gray, a money-serivener, was of so violent and jealons a temper that his wife (Dorothy Antrobus) was obliged to separate from him, and it was mainly through her own exertions that the boy was placed at Eton, and afterwards at Cambridge, where two of her brothers were fellows of calleges, and afterwards tattors at Eton. Both the mother and her sister Mary loved the boy with a devotion that was rewarded by a life-long and passionate attachment. In 1727 he was sent to Etan, whither in the same year also came Horace Walpde, son of the prime-minister. As a boy Gray was shy and studious, and he carried the same temper to

Peterhouse, which he entered in 1734. dominant mathematics in the studies of Cambridge dominant mathematics in the studies of Calmbridge were distasteful to his mind, and a habitual but passive melancholy early seized and mastered him. In the March of 1739 he was prevailed upon by Walpole to accompany him on the grand tour. They spent the next two and a half years visiting the towns and exploring the picture-galleries of France and Italy, and Gray's letters home reveal not only an exquisite taste in art and music, but also the first touch of that romantic love of nature which Roussean was soon to make so The two friends quarrelled at Reggio Walpole afterwards took the blame fashionable. and parted. entirely on himself, and certainly by his efforts the breach was healed within three years, and the friendship never again interrupted. Gray reached England in the September of 1741, and seems now to have begun seriously to write poetry, his Ode on Eton College being written in the autumn of 1742, and the Elegy at least begnn. In the winter he went back to Peterhouse, took his bachelorship in went hack to Fetermonse, took his bachelorship in civil law, and became a resident there. For the next four or five years he studied Greek literature profoundly, and busied himself with abortive projects for editions of Strabo, Plato, and the Greek Anthology. This was perhaps the happiest period of his life, while he breathed the serene air of noble liberaic and was served introphical by breaklibraries, and was as yet untroubled by broken health. He found his relaxation and his keenest pleasure in the company of his friends, and in writing, when absent from them, letters such as only men at that time could write. His holidays were spent with his mother and annt at Stoke Poges, with Walpole at London, Windsor, and Strawberry Hill, or in travelling in different parts of the country. From his letters we see that he had a quick eye for the variety and colour of nature, and certainly he was almost the first of modern Englishmen to see the beauty as well as the horror in the Highland

the beauty as well as the horror in the Highland mountains—those 'unonstrons children of God.' In the summer of 1747 Dodsley printed Gray's famous Ode on a Distunt Prospect of Eton College, and early next year reprinted it with two other pieces in his Missellany. The death of Gray's anut, Mary Antrolus, in the November of 1749 appears to have brought back to his recollection his Elegy, and he seems about June 1750 to have finished it where he began it seven years before—at Stoke Poges. This humane and stately poem is perhaps the hest-known piece of English verse, a masterpiece in the balanced perfection of a metre that piece in the balanced perfection of a metre that beats true to the pulse of human sympathy in the beats true to the pulse of human sympathy in the solenn alternation of passion and reserve, and especially happy in a subject that can never lose its interest for mankind. The poen was sent to Walpole, was handed about in manuscript, and soon became so well known that Gray was forced to print it in the February of 1751. Early in March 1753 appeared in a thin folio the cditio princeps of Gray's collected poems, with designs by Bentley, only son of the famons Master of Trinity. Gray's mother died 11th March 1753, and was buried at Stoke Poges, with an exquisitely simple and affecting epitaph from her son's pen upon her tombstone.

tombstone.

Walpole said that Gray was 'in flower' during the years 1750-55, and during this period he commenced his most ambitions poems, the *Pindaric Odes*, the splendidly resonant *Progress of Poesy*, perhaps his really greatest work, being finished by the close of 1754. The Bard, begun at the same time, was not completed till the summer of 1757. Gray had long had a nervous horror of fire 1757. Gray had long had a nervous horror of fire, and had fixed a rope-ladder from his window in Peterhouse by which to escape in emergency. One night in February 1756 he was roneed from sleep by a pretonded alarm of fire, and, without staying

to put on his clothes, descended from his window into a tub of water that had been placed under his window by some frolicsome undergraduates. pleased at the authorities of Peterhonse for not punishing this brutal practical joke, the poet migrated in 1756 to Pembroke Hall, where he spent the remaining lifteen years of his life surrounded by congenial friends, in the midst of his backer his abite his nightness and his flowers. His two odes were printed at Strawberry Hill in 1757, and were admitted to have put their author at one bound at the head of living English poets. The lanreateship was offered him in 1757 on Colley Cibber's death, but declined. During the years 1760 and 1761 he devoted himself to early English poetry, of which he intended to write a history; later he made studies in Icelandic and Celtic verse, which bore fruit in his Eddaic poems, The Fatul Sisters and The Descent of Odin—gennine precursors of romanticism. In 1768 he collected his poems or romanticism. In 1708 he collected his poems in the first general edition, and accepted the professorship of History and Modern Languages at Cambridge, an office which entailed no duties and yielded an income of £400 a year. Johnson in his perverse life of Gray made, from 'a slight inspection of his letters,' one solitary remark that showed insight, that Gray 'was a man likely to love much where he loved at all.' Certainly no silent and unlanguaged by note two even wors human in his friend. where he loved at all. Certainly ho shert and melancholy poet was ever more happy in his friendships, and few men have been loved with such singleness and devotion. His biographer Mason's affection was not entirely disinterested, but the love of friends like Nicholls, Bonstetten, Robinson, Wharton, Stonehewer, and Brown proves that there must have been some singular cleans in the there must have been some singular charm in the object on which it was lavished.

Gray's latest journeys were made to Glamis Castle and to the Cumbrian lakes, the beauties of which he was the first to discover. He was now comparatively rich, and enjoyed a reputation peculiarly dear to a scholar's heart, and his life glided quietly on, troubled only by fits of dejection and by attacks of hereditary gont. As he was dining one day in the college hall at Pembroke, a severe attack seized him, and after a week's suffering he died, 30th July 1771. He was buried fittingly by his mother's side in his own Country Churchyard

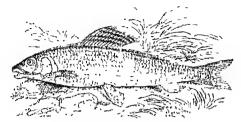
Stoke Poges. Gray said of his own poetry that 'the style he Gray said of his own poetry that 'the style he aimed at was extreme conciseness of expression, yet pure, perspicuous, and musical.' The excelence he aimed at he attained, and in his lyrical work, moreover, he reached in a high degree the Greek quality of structure, especially in his Pindarie Odes. 'I do not think,' says Edward Fitzgerald, 'that his scarcity of work was from design: he had but a little to say, I believe, and took his time to say it.' At anyrate all his work bears the stamp of dignity and distinction, and it was perhaps as much the fault of the chilling atmosphere of his as much the fault of the chilling atmosphere of his ago as of his own hyper-refinement of taste or intermittency in the fits of creative fancy that its quantity was so little. Yet this slender garland of verse has been sullicient to give Gray his rank among the dii majores of English poetry.

The earlier Lives of Gray and editions of his works by Mason and Mittord have been superseded by the study by Edmund W. Gosse (1882) in the 'English Men of Letters' series, and by the same editor's complete edition of his works in prose and verse, including as many as 349 of his letters (4 vols. 1884). See also the essay by Matthew Arnold in vol. iii. (1880) of T. H. Ward's English Poets.

Gray's Inn, one of the four Inus of Court q.v.) in London.

Grayling (Thymallus), a genus of fresh-water fishes in the salmon family, distinguished from trout, &c. by the smaller mouth and teeth, and by the long many rayed dorsal fin. The genus is

represented by five species, inhabiting clear streams in north Enrope, Asia, and North America. The British Grayling (Th. vulgaris) has a wide but local distribution; it prefers rivers with rocky or



Grayling (Thymallus vulyaris).

gravelly bottom and an alternation of stream and pool. The back and sides are silvery gray, with longitudinal dusky streaks; the dorsal lin is crossed by rows of spots. The fish, which may attain a weight of 4 to 5 lb., is esteemed for the table, but should be cooked when newly caught, when it has an odour compared to that of wild thyme. It spawns in April or May, and is in best condition when trout are out of season, in October and November. Another well-known species is Th. signifer, a beautiful fish from the clear affluents of the Mackenzie River, called 'Hewlukpowak,' or 'fish with the winglike fin,' by the Eskimos, and 'paison bleu' by the Canadian voyageurs. See T. E. Pritt, The Book of the Grayling (Lond. 1888).

Graystone, Graywacke, &c. See Greystone, Greywacke, &c.

Graz. Sec Gratz.

Grazalema, a town of Spain, situated in a very strong natural position 53 miles ENE af Cadiz. Its 8000 inhabitants are principally engaged in manufacturing cloth and in smuggling.

Grease, a term of general application to all oily or fatty matters, but generally to those having some degree of solidity, as tallow. It is more specially applied to fatty matters which are so deteriorated by dirt or other impurities as to be unfit for candle-making and other mannfactures requiring some degree of purity in the material. Grease is largely employed as a lubricant for heavy machinery, and especially for the wheels of carriages. The grease employed for the axles of wagons and carts consists of inferior kinds of grease mixed with a little tar. On English railways grease is used for goods and mineral wagons; for passenger carriages palm-oil is used. See Lubricants.

Great Basin, a remarkable triangular plateau of North America, occupying the western portion of Utah and nearly the whole of Nevada, as well as a section of Oregon and California, and extending at its north-castern angle into Idaho. It is bounded on the W. by the Sierra Nevada, and on the E. by the Walsatch Monntains. The base of the triangle, in the N., is some 500 miles from east to west; it extends from N. to S. for nearly 800 miles, and its area is slightly greater than that of France. It is girdled round on every side by high mountains, and traversed throughout by numerous ranges, frequently parallel, yet as often irregularly blending or crossing; the valleys are usually sinks, the chief drainage centre being Great Salt Lake (q.v.), and the Humbold and Carson sinks, at about the same elevation. It has been pointed out by the United States Geological Survey that the Great Basin's areas of greatest depression are to be found near the borders, while its central portion reaches

a much greater elevation. The loftiest range is the East Humboldt, near the middle, which culminates in Monnt Boupland (11,321 feet). Volcanie masses form or concent the original rocks of many of these ranges. The Great Basin contains many streams and lakes, the latter for the most part salt, whose waters never reach the ocean, but are either taken up by evaporation or sink in the desert sands. The mean annual rainfall ranges in different localities from 4 to 15 inches. The platean is nearly destitute of trees, and in general only the upper parts of the valleys are clothed with desert slunds, their lower portions often being occupied either by bodies of water or by a muddy bottom covered with several inches' depth of alkaline salts left by evaporation.

Sec, besides reports to the United States Geol. Survey, works by I. C. Russell on Lake Lahontan (1883 and 1885) and Southern Oregon (1884); and Hague, The Volcance Rocks of the Great Basin (1884).

Great Bear Lake. See BEAR LAKE, GREAT.

Great Britain. Under this head are noticed (1) the island of Great Britain—its geology and geography; and (2) the United Kingdom of Great Britain and freland—its general statistics, &c.

Britain and Ireland—its general statistics, &c. Great Britain was so called to distinguish it from Britannia Minor, or Brittany, in France (see Britannia). The name was a poetical or rhetorical expression till in 1604 dames I, styled binself king of Great Britain, although the tenn was proposed in 1559 by the Scottish Lords of the Congregation. Lying between 49° 57′ 30″ and 58° 40′ 24″ N, lat., and hetween 1° 46′ E, and 6″ 13′ W, long., Great Britain is the largest islaml of Enrope. It is bounded on the N, by the Atlantic, on the E, by the North Sea, on the S, by the English Channel, and on the W, by the Atlantic, the brish Sea, and St George's Channel. The most northerly point is Dunnet Head, in Caithness; the most southerly, Lizard Point, in Cornwall; the most easterly, Lowestoft Ness, in Suffolk; and the most westerly, Ardmanuchan Point, in Argyllshire. Its greatest length is about 608 miles, and its greatest breadth (from Land's End to the east coast of Kent) about 325 miles; while its surface contains 88,226 sq. m.

Geology.—The geology of Great Britain is of peculiar importance. The fossiliterons stata having

Geology.—The geology of Great Britain is of peculiar importance. The fossiliferons stata having heen first systematically stadied and expounded here, British geologists have given to the world the names whereby most of the larger divisions and subdivisions of these strata are known. Nearly all the recognised 'systems' occur in Britain, although some of these are more fully represented elsewhere. Indeed, the only system not found in Britain is the Miocene—the beds formerly classed as of this age being now included in the Oligocene. British geology is no less important from the inlinence it has had in the development of the country. The mineral wealth, especially the coal and the iron, are the real sinews and muscles of Britain's mighty power. No other country has similar advantages in such an area. (See also the article on the geology of EUROPE.)

(See also the article on the geology of EUROPE.) We shalt, in this sketch of the distribution of the British rocks, follow the order of the strata, beginning with the lowest and oldest. It may be said that, in general, the mountainous regions of the north and west are formed of the oldest rocks, and that, as we move south-castwards, we gradually pass over newer strata, until, in the east of England, we come to the uppermost divisions of the Tertiary.

The base rocks of the whole series occur in the Onter Helmides, in Rana, Tiree, and Coll, and along the western shores of Sutherland and Ross. They are assigned to the Archevan System (q.v.), and consist chiefly of coarse gneiss, usually hornblendic,

and various schists, with occasional crystalline linestones—the whole series being veined more or less abundantly with pegmatite. Small isolated less abundantly with pegmatite. areas of Archean occur also in England (Charnwood Forest, the Wrekin, the Malverns). fossils are met with in any of the Archaan ioeks.

The oldest fossiliferons strata in Britain belong to the Cambrian System (q.v.), and are well developed in Wales and Shropshire, attaining a thickness of more than 30,000 feet. They consist chiefly of dark-red and purple sandstones, grits, and con-glomerates, with green slates and slaty shales. The fossils are not abundant, but show a remark-able variety of forms. In Scotland the Cambrian appears to be represented by the red grits, con-glomerates, and sandstones which rest directly on the Archean rocks of the outer Hebrides and the

north-west Highlands.

The Silurian System (q.v.) occupies a large partion of the surface of the country. The typical rocks occur in Walcs, extending over the western portion of the principality from Pembroke to Denbigh, and including the northern portions of Pembroke, Carmarthen, and Brecknock, the whole of Radnor and Montgomery, the south-west of Deubigh, and the whole of the counties to the west. The oldest or Lower Silurian beds are next the coast. The series consists of an immense thickness of shales, slates, grits, and grey wackes, with inter-calated limestones more or less pure. lumnense tracts have hithorto proved devoid of fossils; in other districts the calcareous rocks are almost entirely composed of the remains of marine inentirely composed of the remains of marine invertebrate animals, while the shales abound in zoophytes and crustacea. The high lands in the north of Lancashire and south of Westmorland are Silurian; but it is in Scotland that these strata are most extensively developed. A line drawn from Dumbar to Girvan form the northern limit of these holds in the contract. limit of these beds in the south of Scotland. Except the lower half of the valley of the Tweed, the whole region from this line to near the base of the Cheviots is Silurian. The rocks are chiefly greywacke, with scattered beds of impure limestone. The chief fossils are graptolites, crustacea, brachio-poda, and mollusca. The lead-mines of Wanlockhead and Leadhills are in this district. East and south-east of the Archican and Cambrian rocks of the north-west Highlands come Sibrian rocks which are more or less metamorphosed. Up to which are more or less metamorphosed. Up to recent years geologists believed with Sir R. I. Murchison that all the schists, &c., lying to the east of the Cambrian and Archivan areas, and extending down to the borders of the lowlands in Strathmore, &c., were altered Silurian strata. Probably this is the fact, but the work of the Geological Survey in the north-west Highlands has suggested some doubts. A line drawn from Stonehaven to Helensburgh marks the southward range of those schists and slates, &c.

The Old Red Sandstone System (q.v.), consisting of conglomerates, coarse and line grained sandstones, and dark-coloured flagstones and shales, with characteristic fossils of ganoid and placoid fish, overlies the Silurian in several districts in Scotland. Nearly all Caithness and the scaward portions of Subherland, Ross, Cromarty, Inverness, Scotland. Nairn, and Elgin, belong to these strata. A broad hand, extending on the east coast between Stonelaven and St Andrews, stretches across the country to Helensburgh and Dumbarton on the west. The same strata appear again in Haddington, Berwick, and Roxburgh, in Lanark, and in Ayrshire. Old Red Sandstone likewise occurs in South Wales and the neighbouring English counties, extending from the Silurian district to the Severn and the Bristol Channel, and containing in a large

basin the Sonth Wales coalfield. The highly fossiliferous strata of north Devon, and of south Devon and Cornwall (Devonian system) are believed to be on the same geological horizon as the Old Red Sandstone. They consist of slates, sandstones, and limestones, and contain numerous corals and

shell-fish, The Carboniferous System (q.v.) may be said to occupy a broad tract extending from the Bristol Channel to the base of the Cheviots. The strata are not continuous between these limits, but are broken up in some places by the appearance on the surface of older strata, while in others they are covered by newer deposits. The various detached eoalfields are (1) the South Wales, in Glamorgan and Pembroke; (2) the Bristol, and (3) the Forest of Dean, in Gloncester; (4) the Forest of Wyre, in Worcester; (5) Shrewshury, and (6) Coalhook-labeled and the coal of the coalhook-labeled and the c dale, in Shropshire; (7) north and (8) south Stalfordshire; (9) Warwickshire; (10) Leicestershire; (11) Flint and Denbigh; (12) Lancashire; (13) York and Derby; (14) Cumberland; and (15) Northumberland and Durham, In the northern portion of this great tract of carboniferous strata, where the millstone grit and carboniferous limestone are largely developed, few scams of coal of any value are contained. The limestone in Derby is The carboniferous strata of rich in metallicores. the north of England extend beyond the Cheviots into Scotland, forming a narrow band from the Solway to the North Sca, in the counties of Dunifries, Roxburgh, and Berwick. The only coalfield in this district is one of small extent at Canonbie, in Dunifriesshine. The carboniferous strata in Scotland and the Canonbies of the Carboniferous strata in Scotland and Scattering Scotland and Scattering Scotland and Scattering S land, with the exception just stated, are confined to the immense trough between the Silnrian and Old Red Sandstone systems on the south and the Old Red Sandstone on the north, which is completely occupied by them, except where underlying older strata riso to the surface. Considerable tracts of sandstone and limestone without coal break up the coal-bearing beds into the following coalfields: the Midlothian, the Fife, the Lanark and Stirling, the Ayrshire, the Sanquhar in Dunfriesshire. Beside coal, the whole of the carbonifer ous series contains immense stores of argillaceous carbonate of iron, from the ore of which is produced the great bulk of the iron used in the country. The sandstones of this period form beautiful and durable building stones, the linestones are of great

shales are good fireclays. The Permian System (q.v.), consisting of magnesian limestone and sandstone coloured with oxide of iron, occupies a considerable area in Durham, and borders the carboniferous rocks in Dumfries, Cumberland, Westmorland, Lancashire, Cheshire, Shropshire, Stafford, Worcester, Warwick, Nottingham, and York, and in Glamorgan. The sand-stone is quarried for building.

commercial value, and many of the less indurated

The typical triple series of the Triassic System (q.v.) occurs in Germany; the British representatives consist of variously coloured sandstones and marls. They occupy a considerable surface in Lancashire, Cheshire, Shropshire, and Stafford, and extend as a ribbon of varying breadth, from the month of the Exe, through Devon, Somerset, Gloucester, Wor-cester, Warwick, Leicester, Nottingham, York, and Durham, to the coast at Hartlepool. The only deposits of rock-salt in Britain occur in the Triassic racks of Cheshire and Worcestershire.

The Jurussic System (q.v.) is composed of an extensive series of limestones, marls, sandstones, and shales, which stretch in a broad belt from Yorkshire to Dursetshire, passing through Lincoln, Woreester, Warwick. Northampton, Huntingdon, Bedford, Buckingham, Oxford, Gloucester, and Wilts. The hest building materials in England are obtained from these strata. Jurassic strata occur in Scotland at Brora (Sutherland), in Skye, &c. In the Brora Oolite a seam of coal 31 feet in thickness has been worked off and on since 1820. It is the thickest bed of pure vegetable matter detected in any Mesozoie formation in Britain.

The Cretaecous System (q.v.), consisting chiefly of chalk with underlying sands and clays, all very rich in fossil remains, accupies a broad tract to the east of the Jurassic strata, and parallel to them. Beginning a little north of Flamborough Head, the cretaceous strata may be traced through York and Lincoln, then across the Wash into Norfolk, Snffolk, Hertford, Buckingham, Oxford, Berks, to Hampshire, where they separate into three arms, the one extending south-westward through Wills and Dorset to the south coast; another taking a south-east direction to Beachy Head; while the third stretches as a narrow hand in an easterly direction through Surrey and North Kent, widening out as it nears the coast, where it occupies the district between Ramsgate and Folkstone. The fresh-water Wealden scries, with its abundant remains of reptiles, fishes, shells, and insects, is developed chiefly over the tract that lies between the North and South Dawns.

The Encene System (q.v.), consisting of clays, sands, and mark, abounding in fossils which apparently indicate a subtropical climate, occupies the valley of the Thames, from Hungerford to the sea, and from Canterbury to Saxumudham, as well as a large district in Dorset, Hants, and Sussex, from Salisbury west to Dorehester, and cast almost

to Hastings,

The Oligorous System (q.v.) is very sparingly developed in Britain—the only deposits of note occurring in Hampshire and the Isle of Wight.

The Phiocene System (q.v.), consisting of ferrnginous shelly sand and marl known as erag, occurs chiefly in Suffolk and Norfolk. The still more recent Phistocene System (q.v.) is represented by superficial accumulations of alluvium, gravels, boulder-clay or till, hedded clays, &c., which are scattered over wide areas. To the same system belong the cave-deposits with relies and remains of

nrineval man.

Minerals.—In some respects the most important of British minerals is coal. The greatly-increasing consumption of coal has originated fears as to the possibility of the exhaustion of our mineral fuel (see Coal).—Formerly, the only iron produced in the country was obtained from the greensand of the sonth-east of Eugland, and from the brown hematite of the Dean Forest. The ore was smelted with charcoal. But the introduction of coke and coal for smelting, and the discovery of numerous addifor smelting, and the discovery of mmerous additional and unthought of deposits, especially in eonnection with coal-bearing strata, immensely increased the production of iron, and met the greatly-increased demands for this important metal. In 1760, when charcoal alone was used for smelting, not more than 25,000 tons of iron were produced; while in 1860 no less than 3,826,752 tons were obtained from 8,024,206 tons of ore. The most important ore is the ferruginous shale, or impure argillaccous carbonate of iron, which occurs in connection with every coallield in Britain. The brown and red hematites, associated with the oldest Palreozoic rocks, yield also a large amount of metallic iron. Tin is obtained from only two counties—Cornwall and Devon.—Copper is principally obtained from the same two counties. There were in 1890 about 65 different mines, chiefly in the counties of Lancashire, Carmarthen, and Anglesey, very small quantities being supplied from Cumberland, Chester, Cardigan, and the Isle of Man (see Corren).—
Lead and Silver are obtained from the same ore from muncrous mines in Palæozoie districts. The most productive English mines are in Northumber.

land, Durham, Cumberland, Shropshire, Yorkshire, Derbyshire, Cardiganshire, Glantorganshire, and the Isle of Man. Small quantities are obtained in Somerset, Westmorland, Stafford, and Chester. All the Silurian counties of Wales contain nines. The Isle of Man yields much one. In Scotland the most productive mines are at Wanlock hand the most productive inner are at Wallock-head and Leadhills.—Zinc is obtained chiefly from Cardigan, Denbighshire, Carnarvon, Flint, Cum-berland, and the Isle of Man.—Sulphar Ores (iron pyrites) are raised in different parts of Great Britain.—The following universals are also raised —viz. arsenic, manganese, gold, nickel, silver-copper, fluor-spar, and wolfram.—Salt occurs chiefly in Cheshire and Ulster.

The following table shows the minerals raised in

the United Kingdom in 1888, with their value at

the mines:

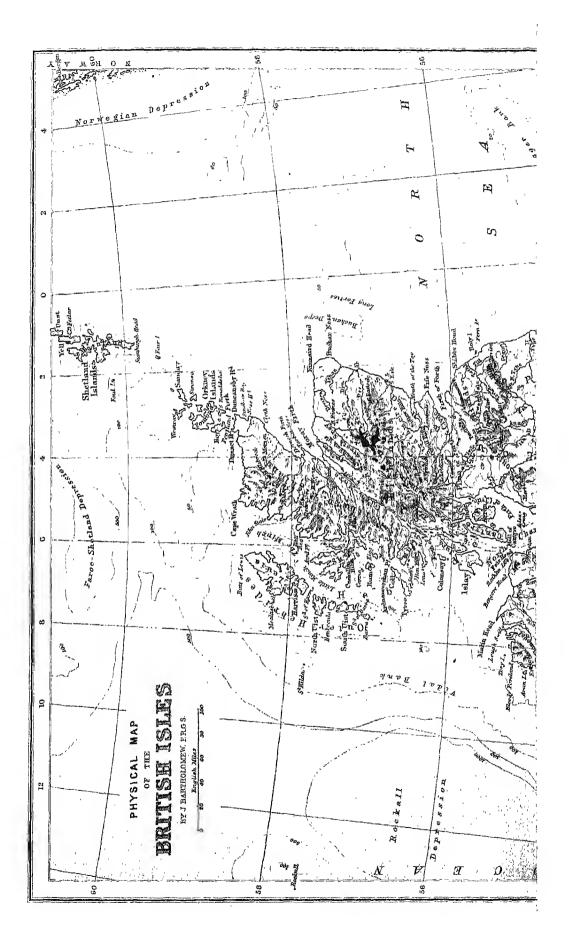
	Quantity.	Value at the Mines.
Alum clay (Banxite) tons	9,060	£4,883
Almn shalc	1,084	248
Antimony ore	7,051	7
Arsenietons	4.021	35,107
Arsenical pyrites	5,325	4,240
Darytes	25,191	26.147
Bog iron ore	10,027	5,403
Chays (excepting ordinary clay) . "	2,562,792	058,410
Coal	160,035,210	12,071,276
Colail and nickel ore n	152	740
Copper ore	$15.132\sqrt{\pi}$	60.080
Copper precipilate	418	0,539
Fluor-spar	140	153
Cold ore	8,814	27,300
Gypsom	130,082	58,008
Iron ore	14,500,713	3,501,317
Iron pyrites	23,507	11,302
Jet 111.	2,217	882
Lead oretons	51,250	438,853
Lignite 11	071	437
Managamese ore	4,312	1,084
Ochre, nmber, &c	7,573	18,387
Oil shale	2,076,469 }	510,120
Petrolemn	85 /	•
Phosphute of lime	22,500	43,312
Sall	2,305,560	700,829
Slates and slabs	471,788	1,057,535
Stone, &c	1911	8,004,007
Sulphate of strontia a	7,061	3,532
Tin ore	14,370	89 1,005
Tungstate of soda	21	54
Wolfram	00	1,625
Zine ore "	20,408	96,084
Total values	A	50.834.097

Total values......

The total value of the coal and other minerals raised in the United Kingdom was \$40,345,945 in 1866, £74,094,638 in 1880, and £55,323,889 in 1887. The total value of the metals obtainable by smelting from ores produced in the United Kingdom (aluminium, antimony, copper, gold, iron, lead, magnesium, silver, sodium, tin, zine) in 1887 was £12,795,993; in 1888, £11,505,321.

Physical Geography.—The physical features of a

country are intimately connected with its geological structure. Thus the Highlands and Southern Uplands of Scotland are built up chiefly of crystalline schists and the older Palacozoic strata, while the intervening lowlands of the so-called Central Plain are composed mainly of the younger Palacozoic rocks and overlying accumulations of superficial deposits. The mountainous tracts of Scotland consist therefore of more enduring or less readily eroded materials than the lowlands. Any wide tract of the Highlands (built up largely of crystalline schists and granitic rocks), when viewed from a commanding position, looks like a tumbled ocean in which the waves appear to be moving in all directions. The mountains are massive, generally round-shouldered and often even flat-topped, while there is no great disparity of height among the dominant points of any individual group. This is the result of denudation, guided and controlled by the petrological character and geological structure of the rocks. The mountains are monuments of erosion; they are the wreck of an old tableland, the upper



A R CHAMBERS LDWPON & EDINBURGH

surface and original inclination of which are approximately indicated by the summits of the various mountain masses and the direction of the principal The Highlands are intersected from southwest to north east by the Great Glen, which probably occupies the line of a dislocation. It is enstomay in geographical text-books to speak of the 'range of the Grampians,' but the Highland mountains do not trend in linear directions, but rather form confused groups. It is probably owing to the fact that many of the rivers and streams run in certain more or less definite directions that the mountains have or less denote directions that the monitains have been described as linear ranges. The greatest height reached is 4406 feet in Ben Nevis, which is the culpidnating point of the Highlands (q.v.), less eminences being Ben Macdhui (4296 feet) and Ben Lawers (3984; with cairn, 4004). The southern limit of the Highlands is defined by a line drawn from the Firth of Clyde at Helensburgh north-east to the sec-coast at Stonehaven. North of this line there are of course considerable tracts of less elevated ground, especially along the coast in Aber-deenshire and the borders of the Moray Firth. Caithdecising that the borders of the storay firm. Cambress is another comparatively low-lying and gently undulating plain. The coast-line of the Highlands, particularly in the west, is repeatedly braken by unmerous and large fiords or sea-lochs, in which the sea is usually abnormally deep. And apposite the same coasts appear the numerous islands of the lungr and Outer Hebrides. These flords are simply sub-merged land-valleys, while the islands referred to are the higher parts of the depressed continental platean. There is reason to believe that at a very late geological date the Scottish coasts extended outwards to what is now the contour line of 100 fathoms. One of the most marked features of the Highlands is the multitude of fresh-water lakes. These vary in size from more tarns to large mountain valley lakes like Lochs Lomond, Ness, Awe, Shin, Marce, Tay, &c., and most of them occupy tock-hasins, which are comparable in character to the deep hollows that accur in the sen-lochs.

The Central Plain of Seothard may be described as a broad depression of relatively easily eroded materials lying between two tablelands of less readily denuded rooks. The principal features of this low-lying tract have a north-east and sonth-west trend determined by geological structure, as is seen in the Sidlaw Hills, the Ochil Hills, the Lennov Hills, &c., in the north, and in the Pentland Hills in the south. The surface of the lowland tracts is likewise diversified by many more or less abrupt and isolated hills, such as Arthur's Seat, Dalmahoy Crags, the 'Castle-rocks' of Edinburgh and Stirling, &c. Most of these heights consist of igneous rocks of a more duruble character than the strata of sandstone, shale, &c., which surround

them.

The Southern Uplands of Scotland form a broad belt of high ground extending from the sea-coast of Haddingtonshire and Berwickshire south-west to the shores of Ayrsbire and Galloway. Like the Highlands the area of the southern uplands is simply an old tableland, furrowed into narrow ravine and wide dale by the operation of the various agents of crosion. The general configuration of this upland tract is somewhat tame and monotonous mountains are flat-topped elevations with broad rounded shoulders and smooth grassy slopes. do not run in linear directions but form irregular groups and masses. The rocks that enter into their composition are chiefly Silurian, greywackes, and shales, and consequently there is less variety of contour and colour than in the Highlands. The hills are not only flatter atop but are generally nuch smoother in outline, there being a general absence of those beetling crags and precipices which are so common in the Highlands. Now and again, are so common in the Highlands.

however, the monutains assume a rougher aspect, more especially in Carrick and Galloway, where the highest point (Merrick, 2764 feet) of the southern uplands is reached. The Silmrian strata are overlaid towards the south by younger Palacozoic rocks, consisting principally of sandstone and igneous rocks which gave rise to different orographic features. Thus we have the broad vale of Tweed and the lower reaches of Teviotdale occupied chiefly by sandstones and shales. The Cheviot Hills, again, are built up in the north-east chiefly of bedded igneous rocks which towards the south-west give place to sandstones that form broad elevated moors and serve to connect the Cheviot Hills with the loftier Silmrian uplands lying to the north-west. In this region of sandstones, &c., not a few of the hills are conical in shape—a form due to the presence of cappings of relatively harder igneous rocks.

Crossing the borders of Scotland and England we find the high ground just referred to is continned southwards through Northnuberland, Cumherland, Durham, Yorkshire, Lancashire, and Derbyshire to form what is called the Pennine Chain. This 'chain' varies in height from 1200 to 3000 feet, reaching its highest summit in Scaw Fell, Cumberland, which is 3162 feet high. When the hills are composed chiefly of sandstones and shales, they show generally a somewhat rounded and monatonous outline, but in the regions where thick limestones abound these usually give rise to more or less bold and abrupt escarpments. The Lake district of Cumberland and Westmorland, being built up mainly of Silurian rocks, reproduces the characteristic features of the southern uplands of Scotland. And the same is to a large extent time of the mountainous parts of Wales (whose highest point, Snowdon, is 3571 foet), while not a few of the features of the Scottish Highlands reappear on a small scale in Devonshire and Cornwall. All these hillier tracts are composed essentially of Pakeozoic and ussociated igneous rocks. The major portion of England, however, consists principally of younger strata, and may be considered on the whole as a somewhat unduluting plain traversed by ridges of varying elevation, which trend in a general direction from north-east to south-west. The band of Jurassic strata, extendto south-west. The band of Jarassic strata, extending from the Yorkshire Moors south and southwest to the coast of Dorset, forms a tortnous belt of tableland and escarpment, rising sometimes to a height of 1500 feet, and throughout its course presenting usually a bold face to the west and a gentle slope to the east. This configuration is the result of geological structure—the escarpments corresponding to the outcrop of the relatively harder members of the Jurassic system, which are under-laid and overlaid of more readily eroded strata, while the general inclination of the strata is to the east and south-east. Similar escarpments accompany the onterop of the chalk, but they are neither so lofty nor so bold. They form the Wolds of Yurkshire and Lincoln, and rise into a low range of hills that extend from Norfolk to Wilts, the more prominent portions of which are known as the Chiltern Hills, the Marlborough Downs, and Salisbury Plain. On the north and south side of the Wealden anticlinal axis, similar chalk hills appear, forming the North Downs in Surrey and Kent, and the South Downs in Hants and Sussex. Lying between the Pennine Chain in the west, and the Yorkshire Moors and Wolds and Lincoln Heights and Wolds in the east, lies the broad depression traversed by the Onse and Trent which is occupied chiefly by Triassic strata. In like manner, a low plain separates the mountain-tracts of Wales from the Pennine Chain, which is similarly occupied by Triassic and younger Pakeozoic strata. The maritime parts of Lincoln, Norfolk, Suffolk, Essex,

and Middlesex are for the mest part lew-lying, being composed of Cretaceous and overlying Tertiary and Quaternary deposits. Thus, in England as in Scotland, the loftier and bolder tracts of the country are met with in the regions occupied by the indurated rocks of the older Palæozoic series. It is in those regions where the most picturesque and diversified scenery occurs. A considerable number of estuaries penetrate the coastlines of England and Scotland, south of the Highland area, but none of these recalls the characteristic features of the deep sca-lochs of the Highland seaboard. The mountain-valleys of southern Scotland, of England and Wales, are not submerged—the lirths and estnavies of such regions being simply the submerged lower reaches of lowland valleys. The whole surface of Britain, with the exception of the extreme south of England, has been more or less modified by glacial action, to which is largely due the rounded contour and flowing outline of all but the highest elevations. The surface-features of the low-lying tracts have also been greatly modified by the enormous morainic and invin-glacial accumulations which were spread over the country in Pleistocene times. Notwithstanding all such modifications, hewever, the prevailing influence of petrological character and geological structure in determining the orographic features of the country is everywhere conspicuous.

The physical geography of Ireland is discussed of-owhere (see IRELAND); here all that need be said is that in its geological relations it is intimately related to Great Britain—its orographic features being likewise determined by the character of its various rock-masses. Ireland, like its sister island, ferms a portion of the depressed continental platean—its highly indented coast-line, more especially in the west and south west, being the result of a comparatively recent submergence. There can be no doubt that in post-glacial times Ireland was joined to Britain which at that period formed a part of the continent of Europe. See Europe (Geology).

continent of Europe. See Europe (Goology).

Meteorology.—The climate of Great Britain derives its peculiar clearacter from the insular situation of the country, taken in connection with the provailing direction of the winds. It is mild and equalify in a remarkable degree, the winters being considerably warner, and the summers colder than at other places within the same parallels of latitude. For at least time months, the mean monthly temperature ranges between 50.0° and 60.0°; for other three months it centimes about 60.0°, or occasionally a little higher, seldom more than four degrees; and for the remaining six months it ordinarily ranges between 36.0° and 48.0°. Since the Reports of the Registrar-general clearly prove that the temperature most conducive to health is between 50.0° and 60.0°, it follows that, as far as concerns temperature, the climate of Great Britain is one of the healthiest in the world.

As appears from data furnished by the Reports of the English and Scottish Meteorological Societies, the mean temperature of England is 49.5°, and of Scotland 47.5°. The mean temperatures of the following places, arranged according to the latitude, have been deduced from the same sources: Guernsoy, 51.5°; Falmonth, 51.4°; Ventnor, 51.1°; Barnstaple, 51.4°; Bournemouth, 50.8°; Greenwich, 50.3°; Bedford, 49.9°; Derby, 48.8°; Livorpool, 49.3°; Manchester, 48.6°; Isle of Man, 48.8°; Scarhorough, 47.8°; Milno-Graden (Berwick), 47.5°; Leith, 47.2°; Rothesay, 47.8°; Greenock, 47.6°; Arbroath, 47.0°; Culloden, 46.6°; Tongne, 46.3°; Sandwick (Orkney), 45.8°; and Bressay (Shetland), 45.0°. There is thus a difference of fully six degrees between Falmonth, in Cornwall, and Shetland. This difference is chiefly attributable to the difference of their latitudes. It becomes greater as the ferce of the sum's

rays increases; so that, while the winter temperatures are respectively 44·2° and 39·0°, the snumer temperatures are 60·6° and 53·4°. The highest summer temperature is 64·2° in London, and the lowest 52·2° at North Unst, the difference being 12·0°. A pretty regular decrease of temperature, with an increase of latitude, will be observed, particularly if the places on the west side of the island be regarded as a series by thomselves. The temperatures of places on the west are in excess of those of places in the same latitudes, but at some distance from the Atlantic. In winter, the differences between the west and the other parts of the country are still greater. Thus, whilst the January temperature of Falmouth is 44·2°; Guernsey, 43·0°; Ventuor and Barnstaple, 42·0°; Isle of Man, 40·8°; Liverpool, 40·6°; and Greenock, and the whole of the west coast of Scotland as far as Shedland about 39·5°—that of Greenwich is 38·4°; Nottingham, 37·2°; York, 30·7°; Scarborough, 38·3°; Leith, 38·1°; Aberdeen, 37·3°; and Culloden, 37·5°.

The south-west winds are the most prevalent throughout the year, except in April and May, when they give place in a considerable degree to the north-east winds. The notoriously dry and parching character of the latter reuder them very deleterious to health. On the other hand, the south-west winds, coming from the Atlantic, are moist and genial, and it is on their guenter frequency—being, as compared with the north-east, in the proportion of two to one—that the salubrity of the British climate in a great measure depends.

In those districts of England where hills do not intervene, the annual rainfall is about 25 inches, and in similar parts of Scotland about 25 inches, and in similar parts of Scotland about 25 inches, and in similar parts of Scotland about 25 inches, but these amounts, which may be considered as the rainfalls of the driest districts of the two countries, are variously increased by proximity to hills or rising grounds, according as the place is situated in the east or west of the island, viewed in relation to the direction of the wind which brings the rain, and by its lying on the wind or on the lee side of these hills. Since it is the south-west winds which bring by far the larger proportion of the rainfall, the heaviest falls take place among the hills in the west of the country; and it may be here observed that, in the west, where there are no hills lying to the north-west, west, or south-west, the annual rainfall is only about 40 inches. Except in a few scattered and restricted districts, the annual rises above 40 inches; but over broad districts in the West Highlands and Skye, and in limited areas in the Lake district, and in North and South Wales, the annual rainfall exceeds 80 inches. At the head of Gleneroe, Argyllshire, it rises to 128½ inches, and at the Stye, Chmberland, to 186 inches. At the Ben Nevis Observatory the annual rainfall is large, or considerably in oxcess of the average, the greater proportion falls during the winter months; but on the other luand, where the rainfall is small, as is characteristic of all the greater propertion falls during the summer months, and there the falls which accompany thunderstorms and east winds occasionally rival the torrential falls of equatorial regions.

Fauna.—The animals found in Britain are for the most part the same as those inhabiting similar latitudes over the whole of the North Temperate or Palrearetic region of the Old World. In fact Wallaco says that the majority of genera in countries so far removed as Great Britain and northern Japan are identical. As the British Islands were formerly connected with the Continent, the general similarity is intelligible enough, while the geological changes of insulation and the restriction of area are enough to account for the one great difference that the British, and especially

the Irish species, are much fewer than those on the mainland. Insulation, however, also abets the modification of species, and thus we find a few forms peculiar to Britain, such as the red grouse (Lagopus scoticus), a shrew (Sorce rusticus), as well as some land-shells and insects. But if we exclude these few exceptions, and take account furthermore of the extinct forms, the general conclusion is simply that the British fauna resembles that of the corresponding pants of the great Palearctic region. See works by Wallace, Murray, Sclater, Heilprin, See works by Wallace, Murray, Sclater, Heilprin, See wirks by Wallace, Murray, Sclater, Heilprin,

&c., cited at Geographical Distribution, Flora.—The British flora corresponds in a general way to that of the Continent, but appears to consist of several more or less distinct sets. The general resemblance may be shown by the fact that out of 117 plants recorded by De Candolle as characteristic of more than a third of the earth's sturface, 100 occur in Britain. As to the various sets, Watson in his Cybele Britannica (1847) distinguishes British, English, Scottish, Highland, Germanic, and Atlantic types; while Forbes (Mem. Geol. Soc., i. 336) also considered the vegetation of Britain as composed of outposts of several floras—from France, the Pyreneau region, Scaudinavia, and other parts. Watson also distinguishes Agrariau and Arctic zones of distribution in Britain, each with three subdivisions marked by characteristic vegetation. The number of Phancrogams has been computed at 1600 species, and there are probably at least twice as many Cryptogams. Among the very vare flowering plants, Oxytropis campestris,

Lychnis alpma, Astragalus alpmus, Saxifraga cernua, Erioxaulon septangulare may be noted. See Watson and Forbes as above; Loudon's Catalogue of British Plants (6th ed. 1867); Balfour's Manual of Botany (1871); Turnbull's Index of British Plants (after the 'Loudon Catalogue,' 1889); and Hooker's Student's Flora.

COMPARATIVE STATISTICS.

AGRICULTURE.—This industry no longer holds the same relative importance as in previous times of our history. It made a great start after the fall of the Stuarts, and its golden epoch was the reign of George II. (1727-60). In 1750 the agricultural wealth (as shown below) was 581 millions sterling, or 53 per cent. of the total wealth of Great Britain, as estimated in 1770 by Young. In 1887 it was nuder 24 per cent. of the total. If Young's estimates be correct, the number of sheep in 1774 was nucl greater than at present, and as for tillage, the acres under crops in 1812 (according to Comber) were only 2,000,000 less than at present. The following table shows merely the state of tillage in the three kingdoms during sixty-one years:

Year.	England,	Scotland	Ireland.	United Kingdom,
1827	11,140,000	2,550,000	5,450,000	19,140,000 ac.
1846	13,300,000	8,800,000	5,210,000	
1866	13,340,000	3,170,000	5,250,000	21,760,000 "
	. 13,920,000	3,510,000	5,210,000	22,040,000 n
1888	13,350,000	£,690,000	4,140,000	21,150,000 n

The distribution of crops in 1888, according to the official reports, was as follows:

	England,	Scotland	Ireland.	United Kingdom
Wheat	2,510,000	70,060	00,000	2,670,000
	1,885,000	1,015,000	1,260,000	4,180,000
	2,485,000	255,000	200,000	2,940,000
All Grain Potatoes Turnips, Vetelies, &c	6,880,000	1,340,000	1,570,000	0,700,000
	445,000	160,000	805,000	1,410,000
	2,385,000	500,000	485,000	3,820,000
	3,640,000	1,600,000	1,830,000	6,660,000
All Crops	13,350,000	3,690,000	4,140,000	21,180,000
	14,500,000	1,190,000	10,920,000	20,700,000
Total	27,940,000	4,880,000	15,060,000	47,880,000

The cultivated area, as compared with total extent, is 75 per cent. in Eugland, 75 per cent. in Ireland, and only 25 per cent. in Scotland; but the value of products is relatively highest in Scotland, as shown below. In 1887 England and Wales produced 110s. per cultivated acre, Ireland, 72s., Scotland, 163s. Thus, Scotland has only 10 per cent of the cultivated area of the United kingdom, while the gross product of tillage and pasture reached 40 millions sterling, or 16 per cent. of the total for the three kingdoms. Respecting tillage at past dates the reader is referred to the works of Comber (1812), Middleton (1820), M'Culloch (1831), and Caird, Porter, &c., for detailed statistics. The production of grain has been approximately as follows, in millions of bushels:

Year.	Wheat.	Bailey, Oats, &c.	Total.	Bushels per Inhabitant,
1830	104	804	408	17
1810		258	401	15
1866	98	290	388	14
1876	84	270	354	11
1887	70	235	311	8

From the foregoing table it will be seen that we produce now only 8 bushels of grain per inhabitant, against 17 in the year 1830. At present the average is 19 bushels per inhabitant in France, 15 in Germany, 42 in Denmark, 42 in United States, 34 in Canada, and 18 in Australia.

The following statistics of live-stock are for

England and Wales down to 1831, and the United Kingdom afterwards:

45				
Year.	Hotses.	Cattle.	Sheep.	Piga
10S8		,	12,000,000	
1774			25,600,000	,
1800			26,150,000	
	. 1,500,000	5,220,000	39,050,000	4,000,000
1867		8,730,000	83,820,000	4,220,000
1877	1,800,000	0,730,000	82,220,000	8,730,000
1888	1,940,000	10,270,000	28,940,000	3,820,000

The returns for 1888 show as follows:

	200 201 200	C MILL II CEIS	ACCITO III I	
	England,	Scotland.	Ireland.	Unit, Klugd
Horses		190,000	510,000	1,040,000
Cattle		1,110,000	4,100,000	10,270,000
Sheep		6,780,000	3,030,000	28,940,000
Pigs	2,255,000	155,000	1,400,000	3,820,000

M'Culloch estimated the products of the three kingdoms in 1846 at 218 millions sterling; his table compares with the products of 1887 thus—all farm products, in million pounds sterling:

	1840.				1887.	
	Agri- cultural	Pastoral,	Total	Agri- cultural.	Pastoral.	Total
England Scotland Ireland	80 19 28	62 0 20	142 28 48	92 24 17	65 16 37	157 40 54
United Kingdom	127	91	218	133	118	251

M'Culloch's estimate for Ireland in 1846 was erhaps too low. The Registrar general for Ireland perhaps too low. in December 1889 published a report on the total value of farming products, thus:

1851-55 annual average ... £71,090,000 1800-70 || || 72,210,000 1884-88 || || 54,010,000 1800-70 II 1884-88 II

This shows a national loss of £18,200,000 per annum to the Irish people, or double the total rental of the country. In seven years, down to August 1888, the Land Court has reduced rents on 243,490 farms from £3,852,000 to £3,094,000, the saving thus effected to tenants being equal to 4 per cent. of their loss by the fall in prices.

Middleton estimated the total value of farm products of England and Wales in 1820 at 127 millions sterling; M'Culloch, in 1846, at 142 millions. In 1887 the total for the three king-

doms was 251 millions-viz. :

	1840.	100/-
	England and	Grent Britaln
	Wales.	and Ireland
Grain	.£51,500,000	£41,100,000
Green Crops	. 28,500,000	52,100,000
Hay and Straw	. 13,000,000	33,000,000
Meat	26,200,000	51,500,000
Dairy	12,000,000	31,200,000
Eggs and Poullay	1,400,000	10,100,000
Foals		6,000,000
Hides, Wool, &c		14,000,000
Timber		1,400,000
Vegetables and Fruit		10,000,000

Total£141,700,000 £251,000,000

The value of farm products in the three kingdoms in 1846 was 218 millions sterling, equal to 45 per cent, of the then estimated earnings of the whole poople. In 1837 it was 251 millions, or only 20 per cent. The above figures morely express the gross product, utterly apart from profits.

The following table of agricultural capital does not include Ireland before 1814. Land is capital-

ised at thirty times the rental.

Year.		Million por	unds storling.	
	Land.	Cattle.	Sundries.	Total,
1750 1814 1848 1868 1880 1887	498 1470 1077 1925 2086 1878	25 74 01 170 209 185	58 172 107 238 255 220	581 1716 1008 2828 2560 2287

In the preceding table an allowance of 10 per eent. is included as 'sundries,' but Chaptal and other French economists allow 14 per cent. It will other French economists allow 14 per cent. It will be noted that the agricultural capital of the United Kingdom has only risen 30 per eent, since 1814, while the wealth of the nation (since Colqubonn's estimate in 1811) has risen 370 per cent. Agriculestimate in 1811) has risen 370 per cent. Agriculture, in fact, is by no means so prosperous as it was one hundred years ago, nor is the gross product so high relatively as elsewhere. The agricultural capital of the United States is only 52 per cent, higher than in the United Kingdom (the value of land being in the United States so much less); the gross product is 200 per cent, greater. Germany has the same agricultural capital as the United Kingdom while her product is 66 per cent cent cycrouse. dom, while her product is 66 per cent. over ours.

The agricultural capital and product of various nations are approximately as follows, in million

pounds sterling :

	Capital	Gross Fraduct yearly.	Ratlo.	
United Kingdom	2287	251	10.0	
United States	3000	776	21.0	
Canada		05	19.0	
Australia	413	62	15.0	
France	3220	440	18.7	
Germany	2330	415	17.8	
Russia	2000	523	25.0	
Argentine Republic	101	4.1	23'1	

FINANCES.—The revenue of the British govern ment has been as follows:

Date	Reign.	Amount,
1080		£1,320,000
1120	IIenry I.	090,000
1250	Henry III.	204,000
1480	Edward IV.	102,000
1540	Henry VIII.	1,300,000
1640		950,000
1700	William III.	4,135,000
1728	George II.	9,030,000
1810	George III.	5,810,000
1830	William IV.	59,400,000
1860	Victoria.	71,100,000
1889	0	80,800,000

In the earlier reigns of the above table the nominal amount was only one third of the above sums; but it must be remembered that the great (4 pence) contained as much silver as our shilling of to-day. Hence the above represents the exact value in silver. The purchasing power was three times greater down to 1540 (Henry VIII.), and twice as great from that time till the death of George II. than what our present money can buy.

Revenue and expenditure since 1842 show as

follows, in million pounds sterling:

Per pol,	Rovenue.	Expenditure.
1842-51	507	546
1852-61	078	700
1862-71	711	092
1872-81		704
1882-88	010	Ø10
47 years	3371	3303

The revenue was made up as follows, in million pounds sterling:

Period,	Customs.	Ехоїно	Stamps.	tuenne-	Pust-	Sundiles.	Total.
1842-51 1852-01		151 181	71 78	55 102	18 30	40 50	567 078
1802-71	221	204	94	78	45 74	69 77	711
1872-81 1882-88.,		$\frac{208}{184}$	110 88	71 90	08	77 52	700 016
47 yea	rs.,1022	088	436	800	235	294	8971

The expenditure was as follows, in million pounds sterling :

Period.	Service of Debt.	Army and Navy,	Government	Total.
1842-51	287	100	102	540
1852-61	285	288	136	700
1802-71	265	208	104	662
1872-81	281	280	233	704
1882-88	196	218	205	010
			-	
47 years	1314	1200	840	8303

National expenditure, not including local taxes, compares with the estimated capital wealth of the nation as follows, in million pounds sterling:

Year,	National Wealth.	Public Exponditure.	Ratio of Expenditure.
1640	250	1	0.4
1700	490	4	0.8
1810	, 2100	50	2.0
1840	4100	58	1.3
1860	5560	71	1.3
1888	6400	80	1.0

If we include local taxation, and compare the gross public burden with the estimated earnings of the British and Irish people, we find thus, in million pounds sterling:

Year.	All Pablic Expenditure.	Eurnings of People.	Rurden,
1840	63	540	11.0 per cent.
1850	08	620	11.0
1860	86	760	11.8
1870	107	080	10.8
1880		1170	1.2.2
1888	157	1280	12.3 "

The national debt was only 13 millions sterling at the beginning of the last century. George III. found it 147 millions at his accession, and raised it

Retained for con-

to 841 millions (in 1817) by his wars in America, Ireland, India, France, &c.; at his death it was equal to 34 per cent. of the wealth of the United Kingdom. In March 1889 it amounted to 698 (including Irish from 1820) show as follows:

millions, or about $7\frac{1}{2}$ per cent. of the estimated wealth of the nation.

COMMERCE.—Official records of British trade

Year.	Itegn. Impor	ts. Exports.	Total.	Per Inhabitant,
1355 <u>E</u> 6	lward III. £120,0	00 £290,000	£410,000	£0 2 10
1573El	izabetli. 2,100,0	00 1,880,000	3,980,000	0 15 0
1087Ja	mes II. 4,200,0	00 4,080,000	8,280,000	1 10 2
1720	orge I. 6,700,0	00 7,700,000	14,400,000	1 18 0
1770Ge	eorge III. 13,400,0	00 10,000,000	29,400,000	3 6 0
1800	11 24,100,0	00 43,200,000	67,300,000	680
1820	orge IV. 20,700,0	00 44,200,000	73,900,000	3 10 0
1840Vi	ctoria. 51,000,0	00 62,000,000	118,600,000	4 4 0
1850	11 99,000,0	00 70,000,000	169,000,000	0 4 0
1860	,, 210,500,0			12 17 0
1870, ,	,, 303,300,0	000 244,100,000	547,400,000	17 7 0
1880	" 411,200,0			20 5 0
1887	n 362,200,0			17 7 0
1888	, 3S7,035,7	43 207,885,230	085,520,979	18 6 2

The Board of Trade returns were as follows for imports:

	1854.	1870.	1887.	somption in 1887.
Grain (including rice and potatoes)	£22,800,000	£30,700,000	£51,200,000	£19,800,000
Raw Cotton		53,5 00 ,000	10,200,000	34,500,000
Manufactures		20,500,000	35,400,000	35,400,000
Meat (including live cattle)	3,800,000	7,700,000	22,800,000	22,400,000
Wool	0,500,000	15,800,000	24,500,000	10,700,000
Sugar	10,800,000	17,000,000	16,500,000	15,900,000
Dan'y Produce	3,100,000	11,900,000	10,400,000	16,400,000
Tea and Coffee	7,200,000	15,400,000	15,000,000	10,600,000
Timber	11,500,000	13,200,000	12,100,000	12,100,000
Minerals	3,100,000	8,900,000	13,000,000	13,000,000
Wines (including spirits)	0,400,000	8,000,000	7,700,000	0,000,000
Flax and Jute	5,800,000	10,400,000	8,600,000	8,600,000
Raw Silk	6,400,000	8,200,000	2,100,000	2,100,000
Sundries	40,700,000	09,500,000	05,800,000	••
Total	£152,400,000	£303,300,000	£362,200,000	

The mincipal exports of British and Irish products were as follows:

THE DIMETRIC CYDO	tos of miner and men hodgers were as re	1101/19:	
	1854.	1870.	1887.
Cotton goods	£31,700,000	£71,400,000	£71,000,000\ ≱ ⊞ ≟
Woollen goods		20,600,000	24.000.000 2 3 3
Linen and Jute goods.	5,100,000	10,400,000	8,700,000 78 2 15
Silken goods	1,200,000	2,000,000	2,800,000 😹 🛭
	All Textiles£48,700,000	£111,000,000	£107,100,000 2 5 5
Iron		26,500,000	25,800,000 (목음년
Other metals		4,700,000	4,300,000 (# 즉, 월
	4,100,000	0,100,000	3,100,000 [등은 구 ::
	2,200,000	5,300,000	12,800,000
Cont	2,100,000	5,600,000	10,200,000 요즘 뜻의
Sundries		40,100,000	58,100,000 뭐일 등 등
	2011 000 000	B+00 (140 AAA	FST
	Total£97,200,000	£199,600,000	£221,400,000

The aggregate trade in merchandisc only, exclusive of bullion, for seven years ending December 1887 showed thus, in million pounds sterling:

(Imports from.	Exports to.	Gioss Trade, 7 years.	Ratio.
United States France Holland Germany Russia Belgium Sweden and Norway Spain Turkey Haly Denmark China and Japan. Egypt Brazil River Plate Chill Portugal Jaya	627 204 174 171 120 102 76 71 33 22 36 60 61 37 19 21	254 180 111 202 53 07 35 31 48 54 17 57 22 40 46 15 17	851 414 285 373 173 199 111 102 81 76 53 126 83 83 60 34 35	186 94 979 36 42 23 22 17 16 1-1 27 18 07 08
Other Countries	135	121	256	5.3
Foreign Countries	2074	1419	3403	73.6
India Australia Canada. West Indies South Africa. Other Colonies	241 178 75 82 38 77	223 181 00 22 30 75	464 354 141 51 77 152	9·8 7·5 3·0 1·2 1·6 3·8
British Colonies	036	600	1242	26.4
Grand Total	2710	2025	4735	100 0

Shipping.—The merchant shipping of the British empire, colonies included, showed as follows:

Year.	Vessels	Tons,	Sallors.	Tons per			Reign.
reat.	remers	10115.	Silliora.	Ship.	Saller.	Augu.	
1588	470	37,400		80		Elizabeth.	
1010	010	83,000		90		James I.	
1060	1,320	120,000		00		Charles II.	
1688	2,620	210,000		80		James II.	
1702	3,200	201,000		80		Anne.	
1760	5,730	487,000		85		George III.	
1800	17 410	1,856,000	140,000	100	14	ii ii	
1810	23,703	2,120,000	162,000	102	15	lt.	
1820	25,374	2,054,000	175,000	105	15	George IV.	
. 1830	23,721	2,533,000	155,000	107	10	William 1V.	
1840	28,902	3,311,000	201,000	114	17	Victoria.	
1850	34,288	4,233,000	239,000	124	18	11	
1800	20,460	5,713,000	230,000	193	25	1 11	
1870	32,020	7,150,000	261,000	216	27	ii ii	
1881	30,531	8,535,000	270,000	280	31	11	
1887	28,212	8,036,000	280,000	320	32	11	

The shipping of the United Kingdom, excluding colonial, has been as follows:

Yerr. Vessels, Tons,	Terme).	Trans.	Seamen.	Tons per		
	Semnen.	Vessel.	Seaman.			
1810 1830 1850 1870 1881 1887	20,258 19,174 25,984 26,307 24,830 22,130	2,211,000 2,202,000 8,506,000 5,601,000 6,490,000 7,340,000	145,000 131,000 148,000 196,000 193,000 203,000	105 114 138 215 200 334	15 17 24 20 33 30	

The following table shows the ratio of British and Colonial tonnage in the world's shipping:

Year Entish Colon		The World.	Unitish Katlo
Ton	s, Tons	Tons	
18202,054	.000,000	6,554,000	40 per cent.
1812 3,311		0,511,000	35 n
1860 5,713		13,686,000	42 "
1570 . 7,150		15,576,000	40 "
1881 8,535	,000 12,111,000	20,046,000	41 n
1857 . 8,930	,000 12,906,000	21,902,000	42 0

In the foregoing tables no distinction is made hetween steam and sailing tonnage. A steamer, however, is found to make three ocean voyages or six short trips in the same time that a sailingvessel takes for one; we must therefore multiply steam tomage at least by four, to arrive at the carrying-power. The following table makes this allowance, and under the head of Effective Carry. ing-power it will be observed that the shipping of the British curpire has multiplied six and a half times since 1840. Reference to American statistics shows that in the same interval the sea-going shipping of the United States increased in nominal tonnage only 200,000 tons, or 25 per cent.

Year, Steam (nor		mal tonnage). Sailing (nomi		inal tounage).	Effective Ca	rrying-power.
1641.	British	Other Flage.	Britisk	Other Flags.	British	Other Plags.
1840	96,000 188,000 502,000 1,203,000 3,105,000 1,355,000	21,000 204,000 318,000 713,000 2,533,000 3,877,000	3,216,000 4,015,000 5,211,000 5,017,000 5,430,000 1,581,000	0,180,000 0,800,000 7,655,000 7,711,000 0,672,000 0,080,000	3,508,000 4,707,000 7,219,000 10,759,000 17,850,000 22,005,000	0,204,000 7,616,000 8,027,000 10,571,000 19,728,000 24,515,000

The carrying-power of the British merchant navy (including colonial) in 1887 was 22,000,000 tons, or considerably more than the total carrying-power of the world (21,800,000 tons) in 1870, since which

		Carrying-power.			Ratio.	
	1810	180)	1857	1819.	1860	1897
British Other thys	Tons 3,500,000 6,264,000	Tons, 7,219,000 8,927,000	Tons 22,005,000 24,515,000	30·6 63·5	41·6 55·4	47 '8 52 '7
The world	0,800,000	16,110,000	40,520,000	100.0	100.0	100.0

In the above table British includes colonial shipping. If we compare the merchant shipping of the United Kingdom only with that of other If we compare the merchant shipping flags we find:

	Year 1887.	Nominal Tomage.	Callying-power, tons,	Ratio.
United	Kingdon	7.340.000	19.590,000	420
	States		8,300,000	17.8
	y		2,610,000	5 7
Norway	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	7 594 000	1,800,000	4.0
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1,310,000	2.8
	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1,305,000	3.0
			2,105,000	6.1
Tinle	********		1,380,000	3'0
			1,640,000	3.5
Sincer.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		890,000	10
awetten.			770,000	
Austran	a	849,000		1.0
Honand	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	. , 286,000	010,000	1.3
Denmin	8	273,000	530,000	1.5
			530,000	1.2
			370,000	8.0
	merlea		400,000	1.0
Other C	ountries	795,000	1,720,000	8.8
				_
Ti	ie world	21,902,000	40,520,000	100.0

Wealfil —Comparing Porter's table for 1840 with the estimates for 1860 and 1887, we find as follows, in million pounds sterling:

	_	
1840.	1800.	1887.
Railways 21	348	831
Houses 770	1104	2040
Fundture 385	582	1320
Lands1680	17 (8	1560
Cattle, &c 280	850	411
Shipping 23	44	130
Merchandise 70	190	321
Bullion 01	105	143
Sundries 810	827	1860
Total 4100	5358	9228

In the above table land in 1887 is put down at 1560 millions, whereas the official valuation at thirty years' purchase, as already shown under the item agriculture, is 1873 millions; but it is generally admitted that the official valuation is twenty

per cent. over the real value.

The increase of wealth from 1840 to 1887

was 124 per cent, or three times greater than that of population. The annual accumulation averaged 64 millions sterling between 1840 and averaged 64 millions sterling between 1840 and 1860, and 143 millions between the latter year and 1887. Wilson estimated the accumulation in 1840-45 at 60 millions yearly; (liflen, in 1880, at 1860 millions yearly; (liflen, in 1880, at 1860 millions) 150 millions. Houses constitute the largest item of public wealth—viz. 2640 millions storling, the value being taken at twenty times the assessed annual rental. In this item alone we see an increase of 1870 millions since 1840, the number of new houses built between that year and 1880 being 2,218,000—say 55,000 yearly. It is probable that new houses represent only one-third of the increase of value as the old ones (4,430,000) have likewise of value, as the old ones (4,430,000) have likewise risen. Allowing for houses built since 1880, the number and value would be approximately thus:

	No.	Value, million 2s.	Per house,	
Bullt before 1840		1730 010	303 340	
Total in 1850	7,100,000	2610	372	

The value of house property per inhabitant varies in the three kingdoms:

£a, per lu	հան	£s, per inhab.
England,,	London	156
Scotland 62	Liverpool	114
Ireland	Glusgow	100
United Kingdom71	Dublin	44

The value of house-property for the whole United Kingdom in 1840 was only £30 per inhabitant. Furniture, according to insurance agents, aver-ages half the value of houses; this item includes, norcover, pictures, clothing, jewelry, and carriages.

Lands.—The value under this head has been explained already under Agricultural Statistics.

Railways are the fourth item of national wealth,

the above statement of capital employed being from official returns. Since 1860 nearly 20 millions yearly have been thus invested in the three kingdoms, of course excluding similar investments abroad, which are comprised under Sundries.

Shipping.—The United Kingdom has 22,200 vessels, aggregate 7,400,000 tons, which, at the medium valuation of £17, 10s. per ton, makes 130 millions sterling. Over 3 millions yearly go into new merchant-vessels built in the three kingdoms.

Merchandise.—We assume six months' imports and exports to represent at each of the above dates the value of merchandise on hand. It is probably under the reality.

Sundries were estimated in 1887 as follows:

	MI	lllon £9
Canals, docks, dockyards, and navy		115
Gas, water-works, telegraphs		178
Colonial loans and tailways		432
Australian mortgages		
Foreign stocks		
Total		1569

The amount of British capital in foreign stocks is variously estimated.

Bullion.—This is not properly wealth, but a token of it. However, in deference to vulgar prejudice, we include the estimated amount of gold and silver at different dates.

According to the Probate 1eturns for 1881-85 the wealth held by the inhabitants of the United Kingdom would then have been only 8200 millions stelling. It must, however, be observed that estates under £100 escape the Probate Court, and many large estates are under-valued in proving succession; also, that the royal navy, dockyards, prisons, lighthouses, high-roads, &c. have to be added to the Probate estimates, which will bring us up to the total of 9228, as first stated.

RELIGION.—The census takes no note of religion except in Ireland, but the ratios of maniages in the different churches enable us to form a close estimate of the adherents to the various creeds in England and Scotland. On the basis of the census of 1881 the figures would stand thus:

	Numbers.		Percentage.				
	England,	Scotland,	JreLind.	England	Scotland,	Ireland	Unit Kingdom.
Church of England Roman Catholie Presbyterian Methodist, &c	18,708,000 1,066,000 114,000 5,990,000	99,000 318,000 2,997,000 281,000	636,000 3,052,000 480,000 48,000	72·3 4·1 0·4 23·2	2·7 8·6 81·0 7·7	12:3 77:4 0:4 0:9	55.8 15.2 10.3 18.7
Total	25,008,000	3,695,000	5,122,000	100.0	100.0	100.0	100.0

The Established Church, before the disestablishment in Ireland in 1869, comprised the following livings:

Nominated by England Ireland, Total Crown. 952 131 1,083
Noblemen. 5,000 340 5,436
Bishops, & 4,694 924 5,618

A report, published in 1880, on the income of the Established Church in England and Wales, was as follows:

Total......10,742

Tithes Committee grants	٠.	776,000
Other sources	•	973,000

Total.....£5,808,000
The above, however, included £962,000 of tithes

1395

12,137

that go to laymen, the real Church income being £4,841,000, distributed thus:

Clerev.	No	Income.	Per head,
Bishops	33	£168,000	£5100
Canons	166	210,000	1440
Rectors1	1.780	3,830,000	330
Curates		603,000	120
Total1	7,029	4,841,000	

The above does not include the 'offertory,' which has been found to range from £100 to £240 per annum in each church, and is estimated to sum up £2,200,000 yearly, at £120 per church. The Ecclesiastical Report for 1880 shows that in forty years the commissioners have expended 22½ millions in creating new endowments to an annual value of £746,000 in aid of 4700 distressed parishes—say £160 each. The commissioners distribute about £700,000 a year in creating new benefices, to an average amount of £23,000 per annum. Balance still in hand, £8,200,000. The above tables do not include collegiate endowments, worth £550,000 a year. Total elergy of Church of England 19,000, including 2000 schoolmasters. The Church of England has, moreover, 232 clergymen in Scotland, 820 in Ireland, and 2700 in colonies and foreign countries, making a grand total of 22,752.

22,752.

The number of churches of all persuasions in England and Wales in 1883 was as follows:

Channel of Frank		חלי
Church of Fug.	and	160
Methodist		114
Independent	2,6	103
Baptist	2,2	43
Colvinist.		(OF
Ramon Cotholi	C	10.1
Charless Capiton	· · · · · · · · · · · · · · · · · · ·	122
Quaker		ΝĎ
Presbyterian		:U1
Various		128
	Total	110

In the above are not included 364 Roman Catholic chapels attached to religious houses, possessing no marriage license.

The condition of the Angliean Church in Ireland in 1880 was as follows:

Number of dergy)O
Endowment £180,00 Donations 118,00 Total income 248,00 Endowed capital 8,260,00	00

There are twelve bishops, who receive £41,500 per annun—average £3600 each. In November 1880 the residue of property formerly belonging to the Angliean Church in Ireland was valued at 12 millions, producing a revenue of £574,000, to be devoted to purposes of general utility or beneficience.

The condition of the Roman Catholic Church in the British empire in 1882 was as follows:

Blaltops.	Priesta.	Churches.	Lasty.
England 15	2112	1188	1,066,000
Scotland 6	306	205	318,000
Iteland 28	3200	2760	3,052,000
Canada 24	1210	1050	2,150,000
Australia 16	376	787	584,000
India	1179	700	1,318,000
Other colonies, 20	315	240	406,000
——			
Total131	8788	7020	0,854,000

The average income in the United Kingdom is £400 for a bishop, and £80 for a priest. In India it is £260 per bishop, and £36 per priest. In Canada and Australia it is higher than in England.

There are 51,000 Jews in the United Kingdom.
MANUFACTURES.—M'Pherson's table of British
manufactures in 1782 compares with the estimates
for 1882 (United Kingdom) as follows:

	1782.	1882.	Ratio.		
	Troa.		1782.	1882	
Cotton goods . Woollen o Linen o Silk o Leather Iron and steel Sundries	£960,000 10,800,000 1,750,000 3,350,000 10,500,000 12,100,000 11,200,000	£95,200,000 46,400,000 11,770,000 7,230,000 34,030,000 127,000,000 406,670,000	1.7 29.5 3.1 5.9 18.4 21.4 20.0	11.6 5.5 1.4 0.0 1.2 15.4 61.0	
Total	£50,000,000	£818,300,000	100.0	100.0	

The growth of the principal manufactures is shown as follows—value in million pounds sterling:

	1 43	1860. 78 38 17 18 17	1870. 94 55 28 10 22	1891. 95 46 21 7 26
Textiles	1 42	16\$ 05	215 82 207	195 127

The increase of textile manufactures is shown by the consumption of fibre, in millions of pounds—viz.:

Year.	Catton,	Wool.	Flax	Hemp.	Jute.	Total.	Lbs, per Inhab.
1801	. 51	77	48	82		261	16
1810	. 111	83	00	107		364	20
1820	. 123	85	87	95		390	18
1830	. 246	110	138	59		553	23
1840	4.18	129	210	67		854	32
1850	. 565	168	240	122	42	1130	41
1860	.1140	221	228	78	86	1750	13
1870	.1101	300	201	100	324	2185	68
1880	.1404	838	227	165	404	2538	70
1882	.1510	334	236	181	512	2782	78
1857	.1400	378	190	190	40·t	2758	7-1

Note.—'Fhroughout this article the comparative statistics are from advance sheets of the enlarged edition of Mulhall's Dictionary of Statistics.

POPULATION.—The following table shows the population of the United Kingdom at successive censuses since the first—that of 1801, in which Wales is given along with England. The counties, with their areas (in acres) and populations, are given for each of the main divisions of the empire under England, Scotland, Ireland, and under their own heads.

	Area in	1801.	1811.	1881.
England	50,823	8,892,536	15,002,443	24,613,026
Wales.	7,303	•	011,705	1,300,513
Scotland		1,608,420	2,020,184	3,735,573
Ireland	32,531	5,395,496	8,106,597	5,174,836
Isle of Man	220		47,975	63,558
Channel islands	75		70,065	87,702
Army, Navy, &c			202,954	215,374
Total, Unit. Kingd.,	120,832		27,057,923	35,241,482

At the census of 1871 the total population was 31,845,379. In 1889 the Registrar-general estimated it at 38,165,526. The probable total in 1891 was set down at 39,843,898. In 1881 there were 2,881,167 natives of the United Kingdom residing abroad; 2,772,169 of them in the United States. In 1881 there were in England and Wales 253,528 natives of Scotland, 562,374 natives of Ireland, and 174,372 natives of foreign states. Of the latter, 117,999 were foreign subjects; 17,767 being American citizens, 37,301 Germans, 14,596 French.

Colonies.—According to the official statoments, the British colonial empire comprises forty-one distinct and independent governments, and, including India, extends over nearly 9 millions of square miles—more than seventy times the area of the mother-country, or practically one-sixth of the land-surface of the globe. The colonies alone have an area sixty times that of the United Kingdom; but their population is only 19½ millions as compared with

the 37 millions in the mother-country. The total colonial area is 7,599,347 sq. m. Of this, 5,948,295 belong to the nine self-governing colonies, with a population of 10,120,917; while 1,651,052 sq. m., with a population of 9,676,976, are under the authority, more or less direct, of the home government.

The following table shows the area and population of the colonies and dependencies of the empire. The populations are given according to the latest

censuses or official estimates:

	-view in sil	Population.
India (British)	868,314	198,790,853
Straits Scttlements	1,472	537,000
Ceylon	25,865	2,763,084
Manritus	713	308,103
Labnan	30	5,883
Hong-kong	30.2	212,051
Australia (the five colonies)	2,044,628	2,805,123
Tasmanla	26,215	142,478
New Zealand	101,468	603,301
Figi	7,740	124,058
Falkland Isles	0,500	1,843
Nalal	18,750	477,100
Cape of Good Hope	213,917	1,377,213
St Helena	47	5,050
Lagos	1,069	75,270
Gold Coast	29,401	1,405,450
Sieria Leone	3,000	00,540
Gambia	CΩ	14,150
Canada	3,400,512	4,826,140
Newtoundland	42,000	103,121
Bermula	10	15,347
Honduras	6,400	27,452
Bahanns	4,166	48,521
Turk's Island	100	4,782
Januarea	4,193	003,500
Whidward Islamls	784	328,680
Leeward Islands	665	119,540
Trinklad	1,751	183,486
British Guiana	109,600	277,038
Gibraltur	17	18,381
Malta	110	100,670
**************************************	110	1001010

The above figures do not include the feudatory states of India (509,730 miles; pop. 55,191,742), the Maori population of New Zenland (41,969), or the aborigines of South Australia.

MISCELLANEOUS. - Innumerable other subjects bearing on the condition, resources, history, administration, &c. of the United Kingdon will be found treated under separate heads, of which the following are some of the more important:

Army,
Banks,
Bradges,
Canals,
Chancery,
Coal,
Colony,
Counton Law,
Cotton,
County,
Criminal Law,
Dickes,
Education,
Emigration,
England,

Agriculture.

England, Church of, finglish Language,

" Literature.

Equity,
Fishenes,
Friendly Societies,
Gadle,
Harbour,
Inmigration,
Ireland,
Iron,
Land,
Lighthouses,
Local Government,
National Debt.
Navy,
Ordnance Survey,

Parish.
Parliament.
Police.
Poor Laws.
Post-office.
Ruilways.
Religion.
Savings-banks.
Scotland.
Steam-navigation.
Tuxation.
Telegraphs.
Universities.
Vital Statistics.
Volunteers.
Wales.

For the arms of Great Britain and Ireland, see Flau, Heraldry. The history is dealt with under the heads of England, Scotland, Ireland, and Wales. See also the works there cited; and the following works may be consulted:

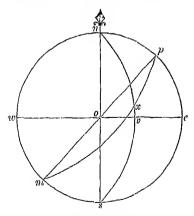
Allen, national wealth, 1840.
Anderson, history of com., 1704.
Anderson, nuclitury, 1878.
Bailly, finances, 1887.
Bailly, finances, 1887.
Bathes, cotton industry, 1885.
Baxter, wealth & taxation, 1869.
Becke, national wealth, 1869.
Bertram, lisheries, 1882.
Bevans, manufactures, 1889.
Brabrook, friend.socioties, 1876.
Bryson, medical statistics, 1863.
Bullon Report, 1819.
Burdett, medical statist, 1881.
Caird, agriculture, 1852-98.

Campbell, nat, resources, 1774. Capper, agriculture, &c., 1801. Carlisle, surveyor U. King., 1813. Chadwick, sanitary, 1847-80. Ghild, woolden industry, 1003. Cabden Cinb essays, 1876. Colquinoun, natl. weaith, 1866. Comber, "I 1822. Cooke, British products, 1823. Craik, hist. of commerce, 1844. Danson, insurance, 1873. Davemant, natl. wealth, 1701. Doubleday, financial hist., 1847. Eden, history of labour, 1707.

Ellison, cotton trade, 1858.
Evelyn, navigation, &c., 1674.
Factoric's Rep., parl blue-book.
Farr, vital statistics, 1837-78.
Fenn, funds & finance, 1838-81.
Fleetwood, prices & wages, 1746.
Fordyce, coal and frun, 1860.
Fossick, iron and steel, 1883.
Fry, local taxes, 1840.
Guilen, financial essays, 1850-86.
Gilbart, banking, 1850.
Graint, vital statistics, 1750.
Glover, shipping, 1880.
Graint, vital statistics, 1750.
Gly, "1870.
Haines, Brit, manufac., 1715.
Hancock, Irish "1870.
Hawkins, necheal statis, 1820.
Hersone, statist, of Ircland, 1862.
Herschel, meteorology, 1851.
Hunl, Prof., coalfields, 1851.
Hunnphreys, vital statist, 1832.
Jeans, fron and steel, 1883.
Jeans, fron and steel, 1883.
Jenns, fron and steel, 1883.
Jenns, fron and steel, 1883.
Jones, instinal wealth, 1844.

Lavergne, Brit, agricult., 1863.
Lawes, " 1830.
Levi, commerce, 1870.
Lowe, agriculture, 1822.
Mabson, mdust. charts, 1882.
M'Culloch, Brit, empire, 1837.
diet. of com., 1809.
M'Pherson, hist. of com., 1809.
M'Queen, British empire, 1850.
M'Queen, British empire, 1850.
Mann, cotton trade, 1860.
Marshall, digest of stat., 1833.
Murtin, culcuies, 1839.
Morean, commerce, 1828.
Multiall, diet. of statist., 1830.
Newmarch & Tooke, prices, 1857.
Ogle, vital statistics, 1832.
Palgrave, local Laxes, 1871.
Parnell, inances, 1827.
Porter, progress of mation, 1850.
Redgrave, fuctories, 1876.
Rugers, Thorold, agricul., 1888.
Statesman's Year-book, 1864, &c.
Vally, commerce, 1853.
Williams, railways, 1870.
Yeals, commerce, 1872.
Young, agriculture, 1780-1808.

Great Circle or Tangent Sailing. In order to have a clear idea of the advantages of great circle sailing it is necessary to remember that the shortest distance between two places on the earth's surface is along an arc of a great circle (see Sphere); for instance, the shortest distance between two places in the same latitude is not along the parallel of latitude, but along an arc of a circle whose plane would pass through the two places and the centre of the earth. The object, then, of great circle sailing is to determine what the course of a ship must be in order that it may echocide with a great circle of the earth, and thus render the distance sailed over the least possible. This problem may be solved in various ways. The handiest practical solution is to stretch a string over a terrestrial globe quite tight between the ports of departure and arrival. The string will lie on the great circle required. A few spots on the track of the string should be transferred to the ordinary navigating (i.e. Mereator's) chart, a free curve should be drawn through these transferred spots, and the ship should be kept as close to that curve as possible. The solution by computation is simply the calculation of sides and angles in a spherical triangle. The method by computation will be understood from the accompanying diagram, where ns are the poles of the



earth, we the equator: nuse represents a meridian which passes through the place p, nuse another meridian through the place x, and pum a portion of a great circle; let p be the place sailed from, and x the place sailed to, then px is the great circle track, and it is required to determine the length of px (called the distance), and the angles npx, nxp,

which are equal to the first and last time courses. To determine these we have three things given: nx, the co-latitute of x; np, the co-latitude of p; and the angle xnp, which, measured along ve, gives the difference of longitude. The problem thus becomes a simple case of spherical trigonometry, the way of solving which will be found in any of the ordinary treatises on the subject of Spherical Trigonometry.

Next, several longitudes on the ronte, say at 5° intervals, are chosen, and the co-latitudes of the spots on the great circle which correspond to these assumed longitudes are calculated. The latitude and longitude of these spots on the great circle being now obtained, the courses and distances from one to the other in succession can be found by the ordinary processes of navigation. The work is somewhat shortened by finding that particular spot on the entire great circle which lies farthest from the equator. It is called the vertex, and is easily found by the property that the meridian maning through it is at right angles to the great circle at that spot. To avoid these, or some of these somewhat troublesome calculations, charts have been constructed on projections different from that of Mercator. On one of these, called the Gnomonic Projection, all the great circles are straight lines; on another, all the great circles are true circles. It has also been suggested that the ports of departure and arrival being given, and the vertex (described above) having been found, and all three having been marked on a Mercator's chart, a true circle drawn through these three spots will be near enough to the great circle for practical purposes. A modification of this approximate method is useful in the run between the Cape of Good Hope and Australia, on which the great circle route goes too far into the southern ice-region. If a spot of highest safe south latitude be here substituted for the latitude of the vertex, a circle drawn through the places of departure, of arrival, and of the substituted safe vertex will give what is called a composite great

circle. From the theory of great circle sailing the following most prominent features are at once deduced: A ship sailing on a great circle makes direct for her port, and crosses the meridians at an anyle ner port, and erosses the meritains at an angle which is always varying, whereas, by other sailings, the ship crosses all meridians at the same angle, or, in nantical phrase, her head is kept on the same point of the compass, and she never steers for the port direct till it is in sight, except in the two cases where the ordinary treat lies (1) on a moviding or (2) on the country track lies (1) on a meridian, or (2) on the equator.

As Mercator's Chart (see Mar) is the one used by navigators, and on it the course by the ordinary sailings is laid down as a straight line, it follows, from the previous observations, that the great circle track must be represented by a curve, and a little consideration will show that the latter must always lie in a higher latitude than the former. If the track is in the northern hemisphere it trends towards the north pole; if in the southern hemisphere it trends towards the south pole. This explains how a curve-line on the Mercator's chart represents a shorter track between two places than a straight line does; for the difference of latitude is the same for both tracks, and the great circle has the advantage of the shorter degrees of longitude measured on the higher circles of latitude. sequently, the higher the latitude is the more do the tracks differ, especially if the two places are nearly on the same parallel. The point of maximum separation, as it may be called, is that point in the great circle which is farthest from the point in the great circle which is farthest from the rhumb-line on Mercator's chart. Since the errors of dead-reckoning, or even of dead-reckoning supplemented by astronomical observation, prevent a ship from being kept for any length of time with certainty on a prescribed track, and thus may necessitate the calculation from time to time of a new path, in practice the accurate projection of a great circle track on the chart would be a waste of time. Some ignorantly object to great circle sailing on the ground that, on account of constant change of the course steered, a ship cannot be kept with absolute precision on the correct great circle track. But, in fact, all that is required of a navigator is to sail as near to his great circle track as convenient; and each separate course will be approximately a tangent to his track, and the shorter these tangents are made the more will the length of a voyage be diminished. See NAMERION.

mately a tangent to his track, and the shorter these tangents are made the more will the length of a voyage be diminished. See NAVIGATION.

Great Eastern. This great ship, the largest piece of marine architecture ever put together, was planned (1852) by Brunel and Scott Eastern was planned (1852) by Brunel and Scott Eastern Steam-navigation Company, a vessel being wanted for the route to Australia round the Cape which could carry enough coal for the voyage out and home, and have besides space for a large number of passengers and cargo. The scheme was for a ship that would accommodate 1000 passengers, 5000 tons of goads, and 15,000 tons of coal. As a first arranged for, the measurements were: length, 680 feet between perpendiculars, or 692 feet upper deek; breadth, 83 feet, or 118 over paddle-boxes; height of hull, 60 feet, or 70 to top of bulwarks. Ten partitions of plate crosswise of the ship divided the interior into 11 watertight compartments, further subdivided by longitudinal partitions. The propelling power comprised both paddle and scrow. The 4 paddle-engines had 4 boilers; the 4 screw-engines had 6 boilers. The smoke from the furnaces ascended 5 funnels, 100 feet high by 6 in diameter. Setting aside the nominal power, all the 8 engines at full force were estimated to work up to 11,000 horse-power. There were 6 masts, 5 of them iron. The vast wall-sided compartments of the ship had facilities for conversion into cabins for 800 saloon passengers, 2000 second-class, 1200 third-class, and 400 officers and crow; or 5000 might have been accommodated in all their details, owing to manerous alterations and relittings.

During 1854-57 the operations proceeded at Millwall, in spite of frequent and heavy financial difficulties. By November 1857 the ship had advanced to the launching condition; but it required various attempts, between November 3, 1857, and January 31, 1858, and an expenditure of £60,000, to effect the launching. During 1858 and 1859 the works continued as fast as the company could supply money; and altogether the vessel was estimated to have cost £732,000. Uncertain how far the original intention of a trade to and from Australia could be realised, the directors determined on a trial trip across the Atlantic. It was a disaster. The ship left the Thames, September 8, 1859; an explosion of steam-pipes took place off Hastings; seven persons were killed and several wounded; and the voyage abraptly came to an end at Portland. The ship started again on June 17, 1860, from Sonthampton, crossed the Atlantic in eleven days, and reached New York on the 28th. During the remainder of 1860 and the greater part of 1861 she made many voyages to and fro, including the conveyance of Foot Grards to Canada, losing money by the insufficiency of the receipts to meet the current expenses, and constantly requiring remirs. For the arrangement and services of the ship in 1865 and 1866 in paying out the Atlantic cable, see Atlantic Telegraph. In 1867 she was

chartered to bring passengers from New York to Havre in connection with the Paris International Exhibition, but the scheme proved a failure. From 1869 onwards the Great Eastern successfully haid some of the most important telegraph cables—across the Atlantic, in the Mediterranean, Red Sea, &c. After acting as a coal-hulk at Gibraltar in 1884, the gigantic vessel was sold in London by anction for £26,200. Finally, after having been used for a time as a 'show' ship, she was sold by auction at Liverpool in November 1888, to be broken up, the five days' anction fetching £58,000.

Great Fish River. (1) in Cape Colony, rises in the Sneenwherg Mountains, and, after a generally south-easterly course of 230 miles, enters the Indian Ocean in 33°25′S. lat. and 27°E. long. The Midland Railway which connects Port Elizabeth and Port Alfred with Kimberley skirts part of the river; there is an iron bridge at Cradock, and Fish River Station is 207 miles from Port Elizabeth.—(2) Great Fish River, or Back's River, in North America, enters an inlet of the Arctic Ocean in 95°W. long., after passing through Lake Pelly. Sir George Back (q.v.) traced its course to the ocean.

Great Grimsby. See GRIMSBY.

Great Kanawha (pronounced Kanaw'wa), an affluent of the Ohio River, is called New River in the upper part of its course, and rises in the Blue Ridge of North Carolina. It has a course of 450 miles, and is navigable to a fall 30 miles above Charleston, and about 100 miles from its month.

Great Marlow. See Marlow.

Greatrakes, Valentine (sometimes called Greatorex and Greatarick), the 'tonch doctor,' was born at Affane, near Lismore, in County Waterford, 14th February 1628. During the troubles of the Rebellion his mother fled in 1641 to England, and settled in Devonshire. From 1640 till 1656 he served as an officer in the Parliamentary army, and from 1656 till the Restoration he acted as a magistrate in his native place. About 1661 he began 'touching' for the king's evil, in obedience, he said, to a divine impulse, and ere long he touched or 'stroked' for agne and for all manner of disease. He was summoned to the king at Whitehall; multitudes flocked to him, and his cures were witnessed and attested by men so eminent as Robert Boyle, Ralph Cudworth, and Henry More. This predecessor of Mesmer did not profess to be always successful; but his claims provoked much controvorsy, and in 1666 he published in his own defence his Brief Account of himself and his cures. He seems to have died in 1682.

Great Salt Lake, in Utali, stretches along the western base of the Wahsatch Monntains, about 4200 feet above the sea, forming a principal drainage centre of the Great Basin (q.v.). Well-marked shore-lines on the mountains around, reaching 1000 feet higher than the present level, show that the lake had formerly a vastly groater extent; this prehistoric sea has been named Lake Bonneville. Great Salt Lake is over 80 miles long and from 20 to 32 broad, but for the most part exceedingly shallow. It contains several islands, the largest, Antelope Island, about 18 miles long. Its tributaries are the Bear, Ogden, Jordan, and Weber, the Jordan bringing the fresh waters of Lake Utal; but Great Salt Lake has no ontlet save evaporation, and its clear water consequently holds at all times a considerable quantity of saline matter in solution; in 1850 the proportion was 22.4 per cent., in 1869 it was only 14.8. Between these dates the annual tribute exceeded the evaporation, and the area of the lake increased from 1700 to 2360 sq. m.; more recently, it has again been slowly receding. Several species of insects and a brine-shrimp have been found in its waters, but no fishes; large flocks

of water-fowls frequent the shores. The first mention of Great Salt Lake was by the Franciscan friar Escalante in 1776, Int it was first explored and described in 1843 by Frennont; for the value of Baron La Hontan's fables, see H. H. Baneroft's Utah (San Francisco, 1889). A thorough survey was made in 1849-50 by Captain Howard Stansbury, U.S.A. See Salt Lake City, and Utah.

Great Seal of England. See SEAL.

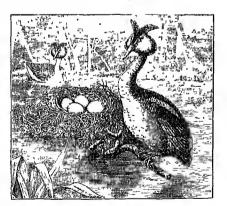
Great Slave Lake lies in the Canadian Northwest Territory (62° N. lat.). Its greatest length is about 300 miles, and its greatest breadth 50 miles. By the Slave River it receives the surplus waters of Lake Athabasea; and it discharges by the Mackenzic River into the Aretic Ocean. See ATHABASCA.

Great Wall of China. See China, Vol. III., p. 185.

Greaves. See Armour.

Grebe (Podiceps), a genus of diving birds (Pygopodes), usually frequenting rivers and freshwater lakes, and visiting the sea only when migitating or in winter. The foot of the grebe is broad and flattened; the toes lobed and bearing separate membranes united only at the hase; the wings are short and rounded; and there is virtually no tail. The legs are placed so far back that the bird stands creet like the penguins. Its movements on land are ungainly in the extreme, but it swims gracefully, and is the most expert of divers, not using its wings, but propelling itself on its downward career solely by the aid of its puddle-like feet. The grebe seldon leaves the water, and can even swim under the surface for a considerable distance, threading its way with wonderful expertness among the stalks and leaves of aquatic plants. A floating nest is built of leaves and twigs and moored to reeds or grasses. The eggs are covered with a chalky incrustation, and are so wide in the middle as to look almost biconical. The mother-bird, before leaving the nest, scratches the weeds over them with her feet, so that the whole looks like a tangled mass of rubbish. She is careful of her young, carrying them on her lack, and even diving with one under her wing. The grebe feeds chiefly on crustaceans, frogs, and small fishes, partly, however, on vegetable food. The plumage varies at different seasons.

The Great Crested Grehe (P. cristatus) is found



Great Crested Grobe (Podiceps cristatus) and Nest.

all the year round on inland lakes in England and Ireland, more rarely in Scotland, and at the sea-coast in winter when driven by frost from the lakes. The adult male is 22 inches in length, and is very conspicuous in flying because of the glossy whiteness of the plumage on the ventral

surface; the female is smaller and has a less developed crest. The best-known British species is the Little Grebe or Dabchick (P. fluviatilis), one of our most beautiful river-birds, which is widely distributed throughout England and Ireland, and is also found in Scotland, where it breeds at an elevation of 2000 feet. In summer the head, neck, and upper parts are dark brown, the under parts grayish-white; in winter the colours are paler. Gould describes the young dabchicks as having 'delicate rose-colomed bills, harlequin-like markings, and rosy-white aprons.' The adult bird only reaches a length of 9 to 10 inches. The Rednecked Grebe (P. griscigena) and the Slavonian or Horned Grebe (P. griscigena) and the Slavonian or Horned Grebe (P. auritus) visit our shores in antum and winter, and the Black-necked or Eared Grebe (P. nigricollis) in spring and summer. An allied genus, Podilyulus, comprising two species, is confined to North and South America. The grebes are much sought after for their plunage, but their shyness and their great agility in diving and swimming under water render them extremely difficult to shoot. So easily alarmed are they that Mr Ruskin, in his somewhat revolutionary treatment of ornithological nomenclature, proposed to rename the genus Trepida. The skin of the grebes is made into muffs or cut into strips for trimmings, the beautiful, satiny plumage on the lower parts of the body of the Great Caested Grebe being in particular request for these purposes. See Howard Saunders, Manual of British Birds: and Ruskin, Love's Meinie.

Grecian Architecture. See Greek Architecture.

Greece is the easternmost of the three peninsulas projected southwards by Europe into the Mediterranean; and being for the most part limestone, is a continuation of the great mountainsystem which shetches from Spain to Syria, encloses the basin of the Mediterranean with precipitons edges, and shuts off the three peninsulas from the continent. In no other country has the geography more influenced the history than in Greece; and the tendencies of this influence are expressed on the one hand in Wordsworth's lines:

Two Voices are there; one is of the Sea, One of the Mountains; each a mighty Voice; In both from age to age thou didst repolee, They were thy chosen music, Liberty!

and on the other in Hegel's dictum: 'Mountains alone divide, seas unite.' Thus, as the west coast of Greece is mountainous and harbourless, whilst the east is full of bays, gulfs, and havens, Greece turned her back on Italy, and was brought into intimate communication with Asia Minor. The easternmost of the three basins into which the Mediterrancan is divided became a Greek lake. The greatest factor in Greek unity was the Ægean Sea, for it mitted the Greeks of the mother-country with the Greeks of the isles and of the coast of Asia Minor. At the same time, as the coast is the first part of a new country to become civilised, and Greece has relatively a longer coast-line than any other country in Europe, just as Europe has more coast than any other quarter of the globe, the history of European civilisation begins with Greece. On the other hand, the spirit of liberty, which nerved the Greeks to resist the Persians, and so save the civilisation of the world, was due to the mountains of Greece; but the divisions between the Greeks themselves were also due to the mountains, which divided the land into cantons incapable of effectual combination against the Macedonian invader who conquered them all.

Let us then begin with the mountains, and, so to speak, articulate the skeleton of Greece. The range which in the north ents off the peninsula from

GREECE 384

the continent of Europe is an extension of the Balkans. From it run chains from north to south, or rather from north-north-west to south-south-east, which form the skeleton of Greece. The most important of these is the range which forms the back-bone of the country, separating first Illyria on the west from Macedonia on the east, and then Epirus on the west from Thessaly on the east. Thus the western boundary of Thessaly is formed by Pindus (7111 feet), the main offshoot of the Balkans. The eastern boundary is also marked not only by the sea, but by important mountains derived from the Balkan system. These are Olympus (9750 feet), Ossa, Mavrovuni, and Pelion. Returning to Pindus, we find that its tendency to the east becomes now more pronounced, and a branch of it, under the name of Othrys, starting from the mighty Tymphrestus (mod. Veluchi, 7606 feet), forms the south boundary of Thessaly. It then is centinued in the celebrated mountains Parnassus (8036 feet) and Helicen, forms the land of Attica, and reappears as the islands of Coos, Cythnos, Seriphos, and Siph-The subsequent course of that branch of the Balkans which we have mentioned as marking in Balkans which we have mentioned as marking in part the castern boundary of Thessuly is equally interesting, for it forms first the island of Eubora, and then the isles of Andros, Tenos, Myconus, Naxos, and Amorgos. The Pelopanneso, 'the island of Pelops,' or by its modern name the Morea, is connected with northern Greece merely by the namow islamus of Corinth, and is separated from it by the long if narrow (all fef Coninth on the west with the Surveyia tall for the east. The compared and the Saronic Calf on the east. The commercial supremary of ancient Corinth, standing as it did on 'two hight havens,' and on the read from Peloponnese to the mainland, was due to its position; and we need only add, in further explanation, that all the great trade routes from the Ural Mauntains, the Black Sea, and Asia Minor to Sicily, Marseilles, and the West converged at Corinth.

The Peloponnese has a mountain-system which is derived, like the others of Greece, from the Balkans, runs parallel to and west of Pindus, and shows itself in the Aeroceraunian Mountains and in Aracynthus. From the central group of mountains which surround Arcadia, and are highest on its north frontiers between Arcadia and nignost on its north frontiers between Areadia and Achea—e.g. Cyllene (Ziria), Aroania (Chelmos, 7724 feet), and Erymanthus (Olonus)—run two important chains, in the same north-north-west to south-south-east direction which we observed in the Pindus. Of these, the westernmost is the Taygetns (Hagios Elius, 7901 feet), the highest peak in the Pelopomese, which, after dividing Laconia on the east from Messenia on the west, and in the promontory of Transrum: while ends in the promontory of Trenarum; while the eastern one separates Areadia from Argolis, runs down Laconia under the name of Parnon (Malevo), and makes its last appearance as the island of Cythera. And here we may complete our account of the islos of Greece by adding that the Ionian Isles, Coreyra, Cephallenia, Leucas, and Zacyuthus, off the west coast, follow the same north-north-west to south-south-cast direction as the mountain-chains of the Peloponnese and the

mainland.

The rivers of Greece are unimportant. They flow The rivers of Greece are unimportant. They flow generally, beth in the Peloponnese and the mainland, south or wost. In the latter the four principal rivers have their source on Mount Lakmon, the starting-point of Pindus, and flow, the Aoos (Viosa) into the Adriatic, the Acheleus (Aspropotamos) to the Gulf of Patre, the Penous (Salambrias) and Haliacmen into the Thermaic Gulf. The principal rivers of the Peloponnese rise near the north of Taygetus: the Alpheus (Ruphia) flows west, the Eurotas south.

People.—The ancient Greeks were a branch

of that family which includes most European peoples, and also the Persians and the Hindus, and peoples, and also the Persians and the filmans, and is variously ealled Indo-Germanie, Indo-European, and Aryan. The Indo-European family is not an ethnological division of the human race, but a linguistic: the languages spoken by the various Indo-Europeans are descended from one and the same original language (now lost), but the peoples who speak it, indeed the people who spoke the who speak it, indeed the people who spoke the original language, need not necessarily, though they may quite possibly, be all of the same descent, for one nation may, directly or indirectly, compel another to adopt its language. Whether the original Inde-European home was in Europe or in Asia is a matter still in dispute. What is less open to doubt is that it was from the north that the Greeks entered Greece, and that they were nomad tribes depending for subsistence mainly on their flocks, though they knew how in extremity to cultithey were hadly acquainted with; they were still in the Stone Age. As they moved sonthwards in separate tribes, the foremost tribes were impelled forward by the pressure of those behind; and even when the whole of the peninsula had been for some which the whole of the permissia has been for some time filled and fully occupied, a firsh wave of im-migrants might wash ever the whole country, distarbing everything. Such a wave was the 'Return of the Heraclidae,' or the 'Dorian In-vasion.' The result was to drive emigrants on to and over the isles of (treece to plant Greek cities and Greek culture on the coasts of Asia Minor. At later times Sicily, the Black Sea, Libya, &c. were dotted with Greek colonies; and wherever Greeks were, there, to the Greek mind, was Hellas, which is thus an ethnological rather than a territorial term. As for the name of the Greeks, they called themselves Hellenes, a designation the origin of which is still miknown; the inhabitants of Italy called them Greei; the Orientals, Ionians; while in Homer they are called Danaens and Achaens.

The modern Greeks are by no means pure-bred descendants of the ancient Greeks. Indeed, it has heen maintained by Fallmerayer that from the 7th century A.D. there have been no pure Greeks in the country, but only Slavs. It is, however, pretty eertain that the 14 million of modern inhabitants are descendants of the three races that occupied the sail at the time of the Roman Conquest—viz. Greeks, Thracians (mad. Wallachians), and Illyrians (Albanians).

Language.—The Indo-European family of speech includes, in addition to Greek, the following branches: Hindu-Persian, Armenian, Albanian, Italian, Celtic, Teutonic, and Slave-Baltic. Of those that with which Grock was supposed to have the most affinities was the other classical language, Latin; and the two peoples were accordingly supposed to have dwelt together after leaving the original home, and te have jointly gone through a Greeo-Italian period. This view, however, is exposed to many difficulties: the inflections of the Latin verb are more clesoly connected with Celtie; the syntax of Greek bears more resemblance to that of Sanskrit; and while the vocabulary of Latin is more clesely bound up with that of the Tentonic languages, the Greek coincides more frequently with the Hinda-Persian. The dialects into which with the Hindn-Persian. The dialects into which the ancient lunguage was divided may be grouped as follows: (1) Ionic and Attic; (2) Dorian (covering the Peloponnese and its colonies); (3) the North-western dialects (those of Phecis, Loeris, Etolia, Acarnania, and Epirus); (4) Æclian (Lesbos, North Thesaly, Beotia); (5) Elis; (6) Arcadian and Cyprian; (7) Pamphylian.

The ancient dialects continued to be spoken at anyrate till the time of Tatian (adv. Grav. 171)—i.e. the end of the 2d century A.D. By 263 A.D.,

i.e. the end of the 2d century A.D. By 263 A.D.,





GREECE 385

however, as appears from a letter of the Emperor Julian, and an anecdote told a few years later of Chrysostom, the common people were beginning to Chrysostom, the common people were beginning to have a difficulty in understanding ameient Greek. Inflections then began to disappear, foreign words to debase the vocabulary, the quantity of syllables to be disregarded, Greek words to be mutilated in form and changed in meaning. None of these tendencies were new: they may be detected from the beginning of the life of the language, even in Homei. Not are they peculiar to Greek. But the conditions were favourable to their development as they never had been before, and mally have been elsewhere. Foremost amongst these developing must be placed the fact that for ceneonditions tmies the language was not a nation's organ of speech, nor the expression of a national life. Attempts are being made at the present day to revert to the use of ancient Greek, 'correct' Greek (ή καθαρεύουσα οι νεοελληνική οι ελληνική), for literary purposes; but the spoken language (δημώδης or χυδαία) is too far decomposed to admit of a successful infusion of ancient forms, and not sufficiently advanced to throw off all connection with the

ancient tongue.

Ancient Religion.—That the Greeks worshipped many gods, and those made in the image of man, needs not to be demonstrated. Let it be granted also for the purposes of this article that religion is not the same thing as Mysteries (q v), or Mythology (q v. also), and that the reader may be referred to the special articles on the various Greek gods for them respective attributes and legends. The question at once arises: In what sense of the word could the Greek have a religion? Their mythology taught them that the gods were deceifful and approved of deceit. (Athens), were covaridly, even the god of deeeit (Athene), were covaridly, even the god of war (Ares), were guilty of earnibalistic infanticide (Cronos), incest (Cronos and Rhea, Zeus and Hera), bestial amours (Zeus), and what was tantamount amongst immortals to parricide (Uranos, Cronos, and Zens). And though Greeks did not spend all their days listening to these repulsive stories, they did every day perform a number of rites and ceremonies which were puerile, unmeaning, and abourd; while they showed the opinion they held of their gods by the faith which they had that they could buy their can it be alleged that this is our way, not then, of regarding their myths and cults. From the time of Xenophanes to that of Euripides philosophers and poets did not weary of denouncing the immorths and bestiality of these myths. Plato proality and bestiality of these myths. Plato protested that the current theory of offenings and saerifice made religion a variety of higgling in the sacince made lengton a variety of higging in the celestial market, a sort of political economy of the spiritual world. Aristophanes and the comedians of the old school could place a god in propria persona upon the stage to be decided for his cowardice, braggadocio, and gluttony. Under these circumstances, then, what sort of religion was it that the Greeks could have?

In the first place, whether it was that Zeus con-trolled the other gods, or that he as well as they was guided by fate or destiny or necessity, the universe was, the Greeks believed as well as we, ruled for some good end. In other words, they had faith; and—which enlists our sympathies—that faith was tried. They were not slow to observe that, though the good do often prosper and the wicked suffer in this world, the rule is far from pleasing and solon. absolute; and we find, e.g. in Theognis and Solon, that they could not reconcile this with their faith, but for all that they did not cease to believe. Again, whatever faith they put in the efficacy of sacrifice and lites and ceremonies, they also believed that a good life was that which was most acceptable in the sight of the gods. They certainly

believed that wrong-doing provoked the displeasme of heaven, and Æsehylus was led to discover that the sms of the father were visited on the children, while to Henodotus and the Greeks generally their gods seemed jealous gods. If it be asked how all this could be reconciled with a belief in their nevolting myths, there are various answers: what was right for the gods might be not right for men, just as the schoolboy has no doubt that it is right for his father but not right for himself to smoke, sit up late, or the like; or the myths might be the invention of misgniding or misguided poets, or might mean something and were not to be inter-

preted literally.

Next, as to then conception of a future world. In the earliest (Homerie) times it could scarcely have been a potent religions factor; it is almost purely mythological. If a wrong doer like Sisyphus or Tantalus is punished in Hades, ment can hardly be said to be rewarded the ghost of Orion continnes, like the Red man's spirit, to go hunting, but Achilles thinks the meanest life on earth me ferable to being king of the shades below. But in eourse of time, when it became impossible to believe that the good were always rewarded and the bad punished in this world, and when even the theory that the sine of the father are visited on the children was found an inadequate explanation of the sufferings of the innocent, the belief in a system of fintine punishments and rewards grew in strength, and in Plato's time (Rep. 330 D. and 363) was firmly held by the average respectable Greek. On the whole then it seems probable that in Greece myth did not kill religion, and that it was not myth but religion which dominated the morality of Greece, as it also dominated Greek art, especially seulpture.

The Greeks, therefore, were not without religion. How then did it differ from modern systems? The more educated Greeks were, in many cases, mono theists, Zeus being supreme, and the other gods his angels; and the conception of the paternal love of God was not strange to them. The essential difference is that the Greeks were not taught their religion by authority, whether of revelation, the state, or a priesthood. They had no revealed book (Homer and Hesiod fixed the theogony indeed, but not the religion); they had no priests having anthority, and as long as a Greek performed the rites prescribed by the state he might interpret them as he pleased. Thus, though on the one hand there was nothing to prevent a man becoming a practical monotheist, on the other, for want of organisation and authority, the many elements of good there were in the religion of the Greeks doubtless acted less potently than they might have acted. Let us remember, however, that had any dogmas been enforced, they might have been the wrong ones. Finally, it is in harmony with the Greek character generally that in Greece there was no devil.

In modern Greece the church is the Orthodox Greek Church, which is 'endowed' in that bishops and arehbishops are paid by the state (the unferior clergy, however, by voluntary fees), and is 'established' in that the archbishops and bishops are nominated by the king, as is the Synod of Five which is supreme in the church; and that, except in purely spiritual matters, the synod is dependent

on the government.

History.—The earliest fact in the history of Greece of which we can feel certain is the Dorian invasion, or as the mythical version of this undoubtedly historic fact terms it, 'the return of the Heraelidæ.' Its date can of course only be approximately conjectured, but we may take it that the changes in the ethnological map occasioned by the Dorian invasion took about a couple of centuries to effect, and were completed about 1000 B.C.

The Homeric poems relate events which the author or authors supposed to be prior to the Dorian invasion; but the supposed facts belong probably to the domain of myth, and the poems themselves were certainly composed after the Dorian invasion. Whether the remains discovered by Schliemann at Troy, Mycene, and Tiryns date from before or after the invasion is still a moot point. The balance of opinion is in favour of the earlier period, on the ground that nothing but such a political cataclysin as the invasion could sweep away so completely the very memory of the dynasties which erected the marvellous monuments that remain to us. But even if the earlier date be assigned to these remains we are still in complete ignorance as to the name and even the race of which they are the sole memorials. It was once the fashion to call everything dating frem before the Dorian invasion Pelasgic, and imagine that thereby all was explained. The Pelasgi were a mysterious people about whom nothing was known, and enjectures were most divergent. Very frequently they were identified with the common ancestors of the Greeks and Italians. But a Greco-Italian period and people are now on the way to being discredited; and the Pelasgi, if we confine ourselves to facts, and the Fenegl, it we comine outseres to faces, were an insignificant tribe of Greeks. Finally, we may dismiss the period antecedent to the Dorian invasion by noting that in it the Phomicians were believed to have largely influenced Greek culture; but the extent of their influence is now universally admitted to have been exaggerated, and it is a question whether it must not be referred wholly

to a later period.

Of the Dorian invasion itself, what we know is that the tribe which had occupied Epirus moved into the valley of the Penons, and were henceforth known as Thessalians; that probably in consequence of this the Armeans, who had occupied Thessaly, were forced forward into the basin of the Copais, where they are known to history as the Bootians; while from Doris bands of warriors kept crossing the Corinthian Gulf, finding their way across Arcadia to the south and east of the Peloponnese, and thereforming Dorian settlements. Possibly to the same period we may assign the occupation of Elis by the Ætolians. Attica lying out of the direct line of impact, which was from out of the direct line of impact, which was from north to south, was madiected by these movements, except that fugitive families, especially of the same Ionic race as the inhabitants of Attica, took refuge there. On the other hand, it is to this movement that the Dorian state, Sparta, which was to be the great and victorions rival of Athens, owed its origin, and indeed we may say its subsequent greatness. The constitution and the poculiar institutions which made the Spatians a nation of soldiers are indeed referred, rather by myth than tradition, to a great legislator, Lycurgus. But they are in truth partly Indo-European customs preserved more faithfully by Sparta than by other Greeks, and still more the outcome of the perpetual struggle for existence which for generations was waged by the handful of Spartans against the large numbers of the native inhabitants. The Dorians settled in Sparta were indeed but a garrison in the beginning; and, to the end, their national life was that of the camp. Amongst the other consequences of the Dorian invasion that which most calls for notice is that in the various districts affected by it the original inhabitants were reduced to slavery; some being like the Helots in Sparta, serfs attached to the soil and belonging to the state rather than to any individual owner, others like the Pericci, in Sparta, enjoying personal freedom, local self-govornment though not political rights; and both being very different from the bought slaves (frequently or mostly foreign) who formed the founda-

tion on which Athenian civilisation, for instance, was based.

The effects of the Dorian invasion, however, were not confined to Greece proper; amongst them must be included the expansion of Hellas in the wider sense of the word, and the colonisation of the coasts of Asia Minor. Not all the original inhabitants of the districts invaded remained to be enslaved : many fled over seas, the Eolians to ensiaved many near over seas, the zeonans to found the Æolian cities, the Ionians to plant the Ionic colonies south of the Æolian, while the Dorians found their way by Crete to the shores south of the Ionic colonies. Of the law that colonies are none rapid in their development than the mother-country, the most conspicuous example is afforded by the Greek colonies in Asia Minor. The seeds of literature, art, and philosophy were all sown and first nurtured in the colonies, though to come to maturity it was in many cases necessary that they should be transplanted to the mother-country. In political life and constitutional history the stages through which Greece proper went were anticipated in the colonies; the change by which monarchy was set aside by aristocracy did indeed perhaps take place about the same time at home and in the colonies—we have little evidence how it took place anywhere—but the change by which aristocratical government was overthrown and democracy established was incomparably more rapid in the colonies. A colony is not the place in which privilege flourishes; tradition is less potent than at home. It was in the colonies, the western not the castern, that the custom which preceded law was first reduced to writing, and the sole right of expounding it withdrawn from the privileged classes. It was in the colonies also that tyranny was first invented. A Greek tyrant was usually an aristocrat who, under the protonce of relieving the misery of the people, acquired a power which he used for ernshing his own class and the people alike beneath his own illegal, personal, and violent sway. As he acquired his power by force, so by force he maintained it, and so by force he lost it, generally in a very brief time; though we must not forget that Syracuse under the tyrant Gelo defeated the Carthaginian power, and under his successor, the magnificent Hiero, almost made Sicily one state.

The rapid, indeed the premature, development of the Greek cities in Asia Minor is testified to by nothing more clearly than by the large number of colonies which they, themselves colonies, founded. The settlements on the Black Sca—e.g. Sinope, Trapezus, Cyzicus—were their creation, as were those in the remotest west—e.g. Marseilles. Many edunies, however, were founded direct from heme: the coasts of Macedonia and Thrace were colonised from Enbea, and it was the Chalcidians of Enbea who led the way in the colonisation of the west— e.g. in Italy, Cyme and Rhegium; in Sicily, A notable mother of colonies too was Naxos. Corinth: Corcyra, Leneas, Anactorium, Ambracia, Apollonia, and Syracuse were all spring from Cor-inth, and themselves in their turn sent ont colonies. Thus all three of the basins of which the Mediterraneau consists passed out of the hands of the Phonicians, who had hitherto monopolised them, into the hands of the Greeks, as a rule with-out bloodshed, for the Phomicians were traders and loved not fighting. But eventually the Carand loved not fighting. But eventually the Carthaginians made a stand, and in 532 B.C., in alliance with the Etruscans, defeated the Greeks off Corsica, and secured the safety of their pessessions in Africa and of the few towns left them in Sielly. Great, however, as was the expansion of Hellas and her colonies, no Greek state ever possessed a colonial empire; the colonies could not and would not be governed from home.

The difficulties of communication and the Greek love of autonomy seenred the independence of the colonies as far as the mother-states were concerned, but not as against neighbouring and foreign powers. Thus, the Asiatic Greeks fell an easy prey, first to the Lydian monarch Crasus (560), and then to the Persian Cyrns, the conqueror of Crasus (546). And thus the Persian empire was brought into the necessity of absorbing or endeavouring to absorb Greece in the same way as the Roman empire was compelled to annex Britain; in the one case Britain, in the other Greece, offered a refuge and a point d'appui to fugitives and instigators to revolt. In the one case Gaul, in the other the Asiatic colonies, would never cease struggling for independence as long as their kinsfolk across the sea were free. What the comes of events was which raised up in Greece a power competent to repel the flood of barbarism which threatened to extinguish the art, literature, and philosophy of Greece, and therefore of the world, we must now briefly state.

The weakness of Greece in the face of an invader was that although the Greeks were no longer nomads but had reached the stage of city life, and although the bond of blood and kinship was being displaced by the tie of neighbourhood and territorial organisation, the numerous communities were subject to no central government. The state of this organisation of the state of this organisation of the state of the of things in Greece may be compared—reasonably, for it had its origin in similar circumstances—with that in England at the time of the so-called Heptarchy, except that there were many more than seven independent states in Greece, and scarcely any of them were as large as even a small English shire. Most of them were cities with but three or four miles of territory; only two succeeded in reaching the size of an English county. Those two were the greatest names in Greece, Attica and Sparta. By what process of conlescence (or synoikismos, as it is called) the various village-communities of Attica became united with Athens for the sent of government we know not. Nor can we do more here than say that before the Persian wars Attica had passed through several social and political and politico-economical crises; Solon's reforms remedied the latter, but his political measures did not prevent the institution of a tyranny, that of Pisi-stratus and his sons. The tyrants, however, were expelled, and the democracy of Athens placed on the path which it was to follow by Clisthenes.

Meanwhile in the Peloponnese Sparta was obtainenabled the Greeks to offer resistance to the Persians with some show of unity. Not only did Laconia stand to Sparta somewhat in the same relation as Attica to Athens, but Sparta conquered the neighbouring territory of Messenia (after two desperate wars), and deprived Argos, hitherto the leading state in the Peloponnese, of the district between Parnon and the sea, and of Cythera. Here, however, Sparta's earcer of conquest and annexation was arrested by the sturdy and successful resistance of the small city of Tegea; and henceforth Sparta's policy was confederation, not annexation. The league of states which had followed Argos was broken up; Epidaurus, Phlius, Trozene, Hermioue, and even Ægina went over to Sparta. Elis had become bound by community of interest to Sparta in the Messenian wars; and Tegea and Arcadia having resisted annexation, submitted to confederation. Thus, in the Peloponnese at least, Sparta was the undoubted leader of the Grecks; and, outside the Peloponnese, Athens promptly set the example of acknowledging Sparta to be the proper leader of all Greece against the Persians. But in 490 B.C., when Datis and Artaphernes, at the command of Davison lead the first Parsian expedition against Darius, led the first Persian expedition against Greece, it was Athens alone that withstood them,

and single-handed won the glorious victory of Marathon, thanks to the genius of Miltiades and the valour of her sons. For a time the danger of invasion was averted, but only for a time. If, invasion was averted, but only for a time. If, however, Xerxes, the successor of Darius, availed himself of the interval for enormous preparations, Athens also waste the control of the interval for enormous preparations, Athens, also under the keen sighted guidance of a great statesman, Themistocles, was also preparing that navy which was to deal the final, fatal blow at Xerxes. The number of that monarch's troops we was the greatest army that ever took the field.

The Greeks' first line of defence—the pass of Tempe—was given up because it could be turned. The scoond—The mopy he and Artemisium—was turned, and the famous band of Spartans were sacrificed by the hesitation and procrastination of the Spartan government. Then the Persians ravaged Attica and destroyed Athens, but not the Athenians. They had fled to the neighbouring island of Salamis, and there they defeated, thanks to Themistocles, the Persian fleet, and sent the Persian monarch home in flight (480 B.C.). Then, indeed, the Spartans made np their minds to join the Athenians in attacking the Persian commander who had been left behind in Greece with a large force. With his defeat at Plataa (479 n.c.) and the victorious attack made by the Greek fleet on the enemy in his own by the Greek field on the change in the waters at Mycale (479 B.C.) the Persian wars came to an end, and the seeds of a far more fatal structure. Because interrecine, were sown. That struggle was between Athens and Sparta.

The position of undisputed leadership which Sparta had enjoyed at the beginning or one a critical wars she had lost before the end of them. For this the main reason must be admitted to be that Sparta acted with disgraceful selfishness, Athens colfishering celfsacrifice, throughout. When, therefore, the Greeks of the islands formed a league the Confederation of Delos—for defence against the Persians, it is not surprising that the foremost place in it was accorded to Athens. In course of time many members of the league preferred to pay mometary contributions rather than supply ships and men; Athens on the contrary was ever eager to provide both men and ships. Thus Athens came to have the power of the sword—and therefore of the purse—in the confederation, which now was practically constituted not of allies but subjects. Not content with the command of the sea she thus acquired, Athens by a series of victories and under the guidance of Pericles attained a position of commanding influence in continental Greece, which, however, only endured from 456 to 445. In spite, however, of the loss of influence occasioned to Atlens by her defeat at Coronea (447), and in spite of the Thirty Years' Truce concluded in 445 between Atlens and Sparta, in 432 Atlens and Sparta, making a quarrel between Cointh and Corcyra their pretext, began their great duel, the Peloponnesian war. Sparta was by its constitution a predatory, Athens an industrial state. The Spartans were farmers, the Athenians merelants. Sparta's strength was on land, Athens' on sea. Sparta prided herself on the ignorance of her sons, Athens on being herself the instructress of Greece. Sparta represented and received the support of oligarchy; Athens, democracy. For thrice nine years, as the onacles prophesied, the war lasted. Its varied and tragic fortunes cannot here be traced. Suffice it to say that there were three things which brought about the defeat of Athens: the early death of her greatest statesman, Perieles; her attempt, magnificent and tragic, to conquer Sicily; and the Persian gold which Sparta was base enough to accept and use.

Thus the supremacy of Sparta (404-379) was established. But it was no sooner established than

a reaction set in against it. Sparta had proclaimed in the Peloponnesian war that her policy was to restore to the Greeks the freedom which the Athenians had rabbed them of. True it is that Sparta broke up the confederacy of Delos; but she did not give freedom to Athens' late subject-allies. She merely displaced democratic by oligarchic governments, and placed in each town a Spartan harmost or governor, whose excesses and violence made Sparta loathed. At the same time it was not the interest of the Persian king to allow Athens to be entirely crushed, or any single state to have preponderating power in Greece. Thus an antipreponderating power in Greece. Thus an anti-spartan coalition was formed; and in spite of the peace of Antalcidas (387), the terms of which were designed to prevent the formation of any more such confederations as that of Delos, in 378 Atheus was enabled to form a new confederacy, and to carry on hostilities with Sparta. These hostilities were not decisive, but they allowed Thebes to unite all Bootia into a single state, and by the genins of Pelepidas and Epaminondas, so to consolidate its power as to defeat Sparta at Lenetra (370), and establish a Theban supremacy. Sparta had to withdraw her harmosts from all cities; and everywhere the domocrats in consequence came into power. Arcadia was made into one seems and messonia a new city, Megalopolis, at its head; and Messonia of Sparts. But Theles was made independent of Sparta. But Thehes was made independent of Sparta. But Thehes was wholly unequal to the position which she aspired to occupy; Athens united with Sparta in resisting her, a groat anti-Theban coalition was formed, and when Pelopidas fell at Cynoscephala (363) and Empirically et Mantinga (263) Thehem. (363) and Epaninoudas at Mantinea (362) Thebes lost the only two men of gentus sho possessed, and with them all hope of maintaining the position she had attained.

Thus the village-communities with which Grook, like English history, begins had become city-states; but the Greoks travelled no further along the path but the Greeks travelled no further along the path of political coalescence or syncikismos. If the English did travel further through heptarchy to final unity, it was because in England 'war begat the king,' whereas in Greece monarchy (if indeed it ever existed) passed away before history begins; and the spirit of autonomy, begotten of republican rule, was centrifugal in tendency. Meanwhile in Macedenia, whose inhabitants, if not of Greek blood, were not distantly akin to Greeks, a kingdom was forming which was destined to impose on was forming which was destined to impose on Greece, from without, the only unity it was capable of receiving. The steps by which Philip of Macedon made himself master of Greece were well marked and rapid. The first places to be absorbed by the expansion of Macedonia were the Greek colonies on the coasts of Thrace and Macedonia, in 357 Amphipolis and Pydna, in 356 Pangaeum, in 353 Halonnesos, Abdera, Maroneia, Methone; and in 348 the fall of Olynthus and its thirty-two confederate towns gave the whole coast as far as the Hellespont into the hands of Philip. The next step to take was to obtain a footing in tho internal affairs of Greece, and this he succeeded in getting, as far as northern Greece was concerned, in the Sacred War (355). Thebes having in vain endeavoured to impose its supremacy on Phocis, abmsed its infinence over the Amphietyonic Conneil to declare a sacred was against the Phocians. The latter found assistance at the hands of the tyrants of Phere in Thessaly, and the aristocracy of Thessaly consequently placed themselves under the protection of Maccdonia. Mcanwhile, even Athens had at last given ear to Demosthenes' denunciations of Philip, and opened her eyes to the dauger which threatened her, when her own colonies were eaptured by Philip; and war had been declared, though not immediately waged, against Philip by Athens. But the Sacred War ended (346) in the

destruction of the Phocians, and Athens-having ruined herself by procrastination-concluded a peace with Philip which confirmed all his gains and ratified all her losses. As yet Philip had found no excuse for interfering with the affairs of the Peloponnese; but this was afforded him in 344 by an ill-timed revival of Sparta's pretonsions, which drove Messene, Argos, and Megalopolis into the drove Messene, Argos, and Wegatopons into the arms of Philip, in spite of Demosthenes' propaganda in the first two places. In 340 Athens, having formed extensive alliances, felt strong enough to openly declare war against Philip. In 339 she saved Byzantium from his attacks, and thereby kept open the route by which her own core came from the Black Sea. In 338 she at length (and too late) consented to Demosthenes' proposal to convert the moneys hitherta devoted to public ammsement to military purposes. But the fatal field of Cheronea was followed by the peace of Demâdes. Philip was asknowledged master of Greece, and elected general of the Hellenic forces against Persia; but before he could commence his invasion of that country he was assassinated by a private enemy (336). A general rising against the Macedonian power was promptly nipped in the bad by Philip's son and snecessor, the world-famous Alexander. His lirst act was to suppress the attempted revolt by utterly destroying Thebes. In 334 he commenced his invasion of Persia. We can but emmerate his chief victories: in 334 his victory at Grantens gave him Asia Minor, on this side of Mount Taurus; in 333 he defeated Darins in the battle of Issus; in 332 he starmed Tyre and Gaza and founded Alexandria; in 331 he finally overthrew the Persian empire in the battle of Arbela; in 326 he crossed the Indus, but farther his troeps refused to follow him. He then sailed down that wiver to the Indian Ocean and though membed to river to the Indian Ocean, and thence marched to Babylon, where, while preparing to invade Arabia, he fell ill and died (323). Alexander not merely conquered Asia Minor—he planted Greek colonies in it, and these centres of culture discharged in it, and these centres of culture discharged functions of the highest importance in the history of the world. They gave to Grock enlare, Greek literature, thought, and art, even to the Greek language itself, a career independent of and unaffected by the fate or decay of Hellas itself. They made Greek the language of the civilised world, though it is true that it was not pure Attie, but the 'common' dialoct, Hollenistic Greek—yet the language of the New Testament. In Alexandria the language of the New Testament. In Alexandria were sown seeds for the finits of which we refer to the section on the literature. Finally it was from these colonies that the Mohammedans made their acquaintance with Greek learning; so that in the time of darkness, when the very tradition of Greek learning had perished from out of western Europe, the Mohammedans were busy aunotating Aristotle even in Timbuctoo.

The death of Alexander was the signal for a fresh struggle for independence; but this, the Lamian, war ended with the battle of Channen (322) in the victory of the Macedonian general Antipater and the extinction of political liberty in Greece. In the struggles between the Diadochi ('the successors') for empire, Greece was the battlefield. Evon when the various generals had made themselves monarchs of the kingdoms into which Alexander's empire split, and Greece was left manpropriated, the efforts of a statesman such as Demochares to obtain a position of independence for Athens by playing off one monarch against another were fruitless. All that lends interest to the next period—that of the Epigoni—is that a new form of political coalescence—federation—was tried, and with some success, by the Attolian and Achean leagues. But the centrifugal tendency in Greek politics was manifest in Sparta's

refusal to join the latter league, which thereon invoked the assistance of Macedonia. Macedonia's interference between Rome and Carthage led to the defeat of Philip V. at Pydna, 168 B.C.; and in 146 Corinth was destroyed by Minimins, and Greece became in fact, if not at once in form, a province of the Roman empire. As such there is nothing here to say of it. Nor at a later time has Greece a history separate from that of the Byzantine empire (q.v.). In 330 A.D. Constantine was converted to Christianity, and founded a 'new Rome' in Constantinople. In 395 Greece was ravaged by the Goths under Alarie. In 747 a great pestilence depopulated large parts of the country, into which Slavonic tribes inunigrated. In 1018 the Bulgarians laid the country waste, but were finally defeated by Basil II. The final separation of the eastern and western churches took place in 1053.

In the year 1453 Mohammed II. made himself master of Constantiuople and, amongst other portions of the empire of the East, of Greece proper. Cyprus and Crete (which had heen in the possession of the Venetians) and the other Greek islands gradually passed into the hands of the Turks, Crete coming into their power in 1669. Twenty years after, the Venetians again began war in the hope of regaining their Greek possessious, and succeeded in winning back the Peloponnese only to lose it again in 1715. Under Turkish rule the Greeks were allowed to become comparatively wealthy, as in the Turkish empire the function of the subject races is to provide for the sustenance of the ruling Turks. With wealth came the spread of education and culture, and a revived conscionsness in the Greeks of what mighty dead they were the descendants. Thus the soil was gradually and naturally prepared for the seeds sown by the French Revolution; and in 1821 the war of independence broke out. In less than a year the Turks were turned out, and Greek liberty recovered. But eivil war ensued; nor was this unnatural. The leaders of the revolution were men who had acquired what capacity they had for leading in the service of the Turks, and had acquired it therefore in a bad school. The cold suspiciou with which the struggle for liberty had at first been watched by Europe was eventually exchanged for warm sympathy and pity, owing to the horrible cruelties perpetrated by the Turks; so that when in 1824 the latter, by the aid of troops from Egypt, succeeded in regaining possession of Greece, there were not wanting volunteers from England and elsewhere to lead and light amongst the Greek forces. In 1827 the Turkish fleet was destroyed at Navarino by the fleets of England, France, and Russia; by Freuch aid the Turks were driven out of Greece, and in 1828 the Greeks had once more regained their liberty. In 1832 Otho of Bavaria was made king; but he ruled despotically, and in 1862 had to leave Greece in consequence. A son of the king of Demark was then mad

the title of George I. He was born in 1845.

Modern Greece.—The legislative power is vested in a single chamber of representatives, the Bonle, which is convoked and prorogued by the king, and consists of at least 150 paid representatives, elected under the ballot by universal suffrage for a period of four years. Ministers are appointed by the king, but are responsible to the Bonle. Greece is divided, for administrative purposes, into sixteen nomarchies or departments, which are again subdivided into eparchies and demarchies—the last under demarchs or mayors elected by the people. The nomarchies are governed by municipal connecillors, who alone have power to levy the local rates; and the eparchies have similar local parliaments, which meet annually. There are local justices of

the peace and courts of first instance, five courts of appeal, and a supreme court at Athens. Trial by jury is maintained. The Greek Orthodox Church is established by law, and to it the great mass of the people belong; but there are some 25,000 Mohammedans in Thessaly and Epirus. There are more than 160 monasteries and numeries, with over 2600 monks and some 500 mms. Elementary education is aided by government and by the commines, and is compulsory for children between the ages of five and twelve; but the law is not carefully enforced outside the towns, and the majority of the people are illiterate. The revenue rose in 1883-89 from 58,537,612 to (estimated) 96,449,453 drachmai the drachma was equal to the franc from 1882 to 1885, when the re-issue of a forced paper entrency reduced the value to about 81d.); the expenditure increased from 72,011,648 drachmai to 122,805,127 in 1885, but was estimated at 95,974,420 in 1889. The total debt of Greece as on 1st January 1890 was officially stated at 530,521,960 drachmai, besides a floating debt of 101,000,000 drachmai; and to this must be added the kingdom's portion of the Ottoman public debt and certain other dues to Turkey. Fully a third of the expenditure is absorbed by the interest on the debt, and a fifth by the ministries of war and marine. In 1889 the nominal strength of the army on a peace footing was 24,076—which in the event of war could easily be raised to 100,000; all able-bodied males are liable to service, which includes one or two years with the colours, eight or seven with the reserve, and ten in the landwelr. The navy consisted of four small ironclads, sixteen gunboats, twenty-one torpedo boats and launches, and several other vessels; the officers and men number nearly 3000, the men being recruited by conscription among the scafaring population and by enlistment.

In 1879 the area of Creece was 19,809 sq. m., with a population of 1,679,775 (1,457,894 in 1870); the Thessalo-Epirot districts incorporated with the kingdom in 1881 (as an outcome of the Berlin Treaty) added to this a territory of 5161 sq. m., with a population of 299,677; total, 24,970 sq. m. (less than balf the area of England), with 1,979,452 inhabitants (less than one-twelfth of the population of England). Besides the Greeks of the kingdom, the Greeks in various parts of the Ottoman empire—notably in Constantinople, Macedonia, the western parts of Asia Minor, Crete, Cyprus, and the smaller islands—number above 6,000,000. In 1889 the population had increased to 2,187,208, and showed a remarkable excess of males over females, in the proportion of 107 6 to 100. Athens, the capital, had in 1889 a population of 107,746; the towns next in size being Patras, Pireus, Hernupolis, and Corfu, all above 20,000; and there are four others between 20,000 and 10,000. Greece, although one-half of its area is pasture-land or waste, is mainly an agricultural country; but the land is mostly in the hands of peasant proprietors; agricultural machinery is unknown in many districts, and the implements of husbandry are of the most primitive type. Besides cereals, fruits, sugar, tobacco, cotton, and dyestuffs are raised. The chief articles of export are currants (about half of the total), lead and other ores, olive-oil, wine, honey, sponges, &c. The principal imports are ecreals and textile goods. In 1887 the special imports and exports were valued at 131,849,325 and 102,652,487 drachmai respectively; in 1888, at 109,149,182 and 95,653,741 drachmai. Nearly a third of the total trade is with Britain, and about one-seventh each with Russia and France. The herding of sheep (3,465,000) occupies about 9 per cent, of the people; the sponge and coral fisheries employ more than 900 boats. The minerals of Greece include lignite, argentiferons lead, zinc, magnetic iron, and marble. In 1889

there were some 1200 flour-mills worked by water and wind, and less than 100 by steam; over 200 distilleries; and numerous dyc-works, tannerics, and manufactures of machinery, eotton and silk goods, &c. 440 miles of railway were open, and 205 in course of construction; and there were nearly 4400 miles of telegraph lines. For the eanal across the

istlunus of Corinth, see CORINTH.

Literature.—The distinguishing characteristic of classical Greek literature and the clue to its development is the fact that it was oral, that it was in all easos composed not to be read with the eyes, but to be delivered by the lips and heard by It is the distinguishing characteristic, because when Greek literature ceased to be oral it ceased to be classical; and it affords the clue to the evolution of classical Greek literature, because that literature went through a series of forms—epic, lyrie, and dramatic, historical, oratorical, and philosophical-which forms were impressed on it by the changing nature of the circumstances under which the composer addressed his audience. These with the change of social and political conditions.
Thus, in ancient Greece the form of literature prevailing at any given period was the expression and outcome of the form of society existing at that time; and hence the history of the literature is but one aspect of the history of the people. place and accasion on which an andience is gathered place and accasion on which an andrenee is gathered together determines the form of that which is addressed to it is plain enough in the case of a sermon and a play. That it was not the author who determined whether a play or an oration should be most popular is explained by the fact that it is the great public which it is most artisty. ambition to please; and it was circumstances which decided that the great public in Athens should be found at one period in the law-courts rather than in the theatre, at another in the theatre rather than in the law-courts. When political liberty was extinguished in Greece there ceased to be a great public, works were composed for the approval of learned and narrow cliques, and classical Greek literature was at an end. Without a great public,

no great artist.

We new propose to trace the successive ferms through which classical Greek literature went, and to show to what sacial and political causes these were due. For details as to the lives and works, and for criticism on the genius, of individual anthors, we must refer to the articles in which they receive individual attention. In the literature of the control ture of Greece, as of other countries, verse preceded prose, partly because the pleasure verse gives to the ear is much more pronounced and more easily produced, and partly because verse is so much more effectually retained in the memory—a point of cardinal importance when writing is as yet unknown. Of poetry, the list form to appear in Greece was epic. An epic poem is a marrative peem; and the epics of Hauner—the only epics that peem; and the epics of Henner—the only epics that have come down to us, though by no means the only epics composed—are of censiderable length. This fact, which has been regarded since Wolf as indicating that the poems could not have existed at such length when writing was either unknown or not used for literary purposes, is really the best proof that they belong to the most ancient period of Greek literature. That poems as long as those of Homer may be handed down by memory is beyond denbt. The question is when and where could a public have existed for whom we may suppose them to have been composed? They cannot indeed have been recited at a single sitting; therefore they cannot have been composed for andiences such as those at the great Greek festivals. They must have been composed for an audi-They must have been composed for an audi-

ence small enough to be gathered together night after night until the whole had been recited. Further, the audience must have been such as it was a pride for the artist to address. was a price for one artist to address. The only audience which satisfies all those conditions is that which is occasionally described in the Homeric The only poems themselves, that gathered in the hall of the chieftain of the village-community, which was the earliest form of Greek as of English society. At no other period in Greek history was there an andience for whom we can conceive a poet compos-

ing such poems as those of Homer.

When in the natural course of development the village-community expanded into the city-state, the village chieftain's hall ceased to be the centre of society. 'Society' now consisted of the members of the aristocratic or oligarchic families. They cared not to hear of the past glories of the heroic anecstors of those chieftains whom they may them. selves have helped to turn out of power, the same andience gathered together night after night in any great house; symposia, or drinking-parties, were indeed given frequently, but the gnests were not the same on each occasion. Song again was as much in request as wine at these drinking-parties, but the songs were from the nature of the case short, their subjects drawn from frequent themes, love, wine, and their most frequent themes, love, wine, and politics. In a word, the second form assumed by Greek literature was that of lyric poetry—the lyrics of Suppho, Alcaus, Anacreon, Archilochus, Ihyeus, Theogris. There was indeed another form of lyric, which was charal and religious; and it needs special mention, not because its genesis differed essentially from that of other lyric poetry, for it also was composed for a special occasion, with reference to the present and under circumstances which precluded length of treatment, but because from it was developed the third form of Greek verse literature—the drama. Choral lyric might celebrate the victory of some Chord lyre might celebrate the victory of some athlote at the national games, or the mighty works of the god at whose testival the poem was designed to be performed. The odes of Pindar which have some down to us belong to the former class. To the latter class belong the odes addressed to Dionysus (q.v.), the god of wine, from which the drama was evolved. Unfortunately of these odes, dithyrumbs, we have not a specimen. Simonides of Cops. Anion and Alexan was the orgat component. Coos, Arion, and Aleman were the great composers of this class of lyric.

That an ode relating the adventures of a god should first be accompanied by sympathetic gesture and action, and should then come to be really acted, is readily comprehended. And that the gestures should be especially realistic at the festivals of the god of wine is not hard to believe. But it is not probable that literary form would have been given either to the more or to the less solemn side of this piece of ritual had it not been that present on these occasions was a public greater than any that a poet had hitherto been able to address-i.e. the whole of the community guthered together for an act of public worship. The development of the drama was the work of democracy. A greater andience was provided at the public festivals of a democratic state than could be found in the house of any oligarch; and genius at once descried the form of literature adapted to the symposium for that by which it could reach the cars of the people that by which it comit reach the cars of the people at large. At the same time the drama, though it required other powors as well, afforded scope for the exhibition of both cpic and lyric power. The chorns, out of which the drama grew, was still retained in the drama; and thus lyrics were an ossential part of the play. On the other hand, much of a Greek play consists in the narrative of what has eccurred off the stage. The number of

dramatic poets produced by Greece was very great: for ns the tragedies of Æschylus, Sophoeles, and Enripides—The Three—and the comedies of Aris-

but the drama is not the only form of Greek literature for which we have to thank Greek To it we owe all three forms of prose democracy. To it we owe all three forms of prose literature—history, oratory, and philosophy. For now at length, after composition in verse had been practised for some four centuries, composition in prose was attempted, which-seeing that the Greeks had spoken prose all the time, even as M. Jour-dain—seems strange. In fact, however, a really dain-seems strange. original idea, indeed even a moderate departure from what 'is always done' on a given occasion, is not of frequent occurrence in the history of the world. The mere conception that it was possible ta compose otherwise than in verse seems not to have occurred to any one. Then, to put on paper a series of connected ideas, when one has them, is nut a matter of absolute ease and simplicity. quite conceivable that it may have been easier to write in verse than in prose; the earliest philo-sophers—Xenophanes, Parmenides, Empedocles— apparently found it so. When, however, the idea of prose composition had been once struck out, it was, thanks to the encouragement afforded by the great public, rapidly worked out in various directions. So rapidly indeed that it is difficult to say whether oratory, though distinctly posterior to history, is or is not to be ranked as earlier than As, however, the style of the greatest philosophy. writer of philosophy, Plate, would certainly not have attained the perfection it displays had not some of the orators previously demonstrated what could be done with the language in certain directions, we may consider philosophy to be the latest of the three forms of Greek prose literature, and to correspond to the latest of the three forms of Greek verse literature, the drama, in that each resumes in itself the two forms which precede it. Natrative and argument both find their place in philosophy, as lyric and epic in drama. Otatory, philosophy, as lyric and epic in drama. Oatory, like lyric, is the expression of the individual man dealing with the present. Prose begins with narrative in the form of history, as verse begins with narrative in the form of epic

Again, it is somewhat difficult for us to realise that history could have been composed for oral delivery. But the fact remains that, though in the time of Xenophon, the most recent of the three historians whose works have survived, there was a trade in books, at the time when his predecessors Thucydides and Herodotus composed their works there was no reading public for whom they could have intended their histories. Herodotus, the 'father of history,' probably recited his at the great national festival of the Olympian games. Thuey-dides as much as states that he wrote for posterity, and implies that in so doing his design was

singular.

In the case of oratory, the essentially oral nature of this form of literature is patent. That it should have been developed as a form of literature when it was is due on the one hand to the cultivated taste of the democratic dicasts or jurors, who demanded literary merit in the speeches addressed to them, and on the other to the frequent access to the great imblic afforded by the law-courts to aspiring genius. The accident that at Athens a suitor was compelled himself to speak on his own behalf, and therefore evaded the intention of the law by getting a professional speech-writer to com-pose a speech for him to learn and deliver as his own, did much to open the law-courts to literary genins and to develop eloquence. Of the orators we are fortunate enough to have considerable remains-of Antiphon, Andocides, Lysias, Isocrates,

Isaeus, Æschines, Hyperides, and, greatest of all, Demosthence

Finally, the third form of Greek prose literature, philosophy, was essentially oral. gave to philosophy the direction it has followed to this day, never wrote a word. Plate and Aristotle lectured, and if they also wrote, it was that their written teaching might be read alond in the schools

they founded, after they were gone.

In nothing is the post-classical period of Greek literature more remarkably distinguished from the classical than in the fact that we no longer find one form of literature cultivated at a time, but all kinds simultaneously. If the term 'post-classical' is sometimes employed, and sometimes justly respected to the property of the post-classical is sometimes of the property of the post-classical is sometimes of the property of the post-classical is sometimes of the property of sented as being almost a term of reproach, it must be admitted on the one hand that Theophrastns, Theoritus, Menander, Plutarch, Lucian, are names that would adorn even a 'classical' period, and on the other that, notwithstanding these great names, the post-classical period created no new form of literature, that, viewed as a whole, it can point literature, that, viewed as a more, it is to no progress made in any of the forms already created, and that all its activity, which was enormally the direction of deterioration. When we pass from the classical period to the post-classical we have as on guiding principle not dovelop-ment but deex. In the Alexandrine period (332-146 B.C.) this is less notable than in the ages which succeeded it up to the fall of Byzantium (1453 A.D.), though it is unmistakable. The Alexandrine period is so called because Alexandria, the colony founded by and named after Alexander, became, thanks to the learned liberality of the first three Ptolemies, the sent of two great libraries, and the greatest centre of literary culture. But though the greatest it was by no means the only such centre of culture in the age to which it gives its name. Egypt was not the only one of the kingdoms that rose from the mins of Alexander's empire which could boast of a literary capital supported by the liberality of its kings. Antiochia, Pella, and, above all, Pergamum, vied with Alexandria; and the rivalry of Pergamum was only extinguished when Antony sent its magnificent library of 200,000 volumes as a presont to Cleopatra. But before this Pergamum had had time by its cultivation of rhetoric to affect Rome and Roman oratory in no small degree. Nor were the true Greek abodes of literature at once deserted by the Muses during this the first period of decline. In Athens the new councdy, with Menauder for its great representative, and philosophy, with Theophrastus as its chief, still flourished. In Syracuse there was developed, not indeed a new form of literature, but a new mixture of ancient forms—bucolic poetry, which is a mixture of the narrative and the dramatic forms, while, although the (usual) employment of the hexameter anishing the district end of the recurrence of a refrain gives it a lyrical air. History can be said to exhibit, at the most, incipicut decay in a period which can point to Polybins, to say nothing of Berosns and Manetho; and epigranimatists were numerous. Aratos indeed, the greatest of Alexandrine didactic poets, and Apollouins, the greatest epic poet of this period, have done nothing that they should be compared with 'classical' writers of hexameters. But it is not on its poetry that Alexandria can base its claims to our gratitude; it is on all that the librarians of Alexandria did to preserve the stores of classical literature.

Succeeding ages produced several respectable prose-writers—Pansanias the archeologist, Arrian the second Xenophon, Josephus the historian—and two great prose-writers, Plutarch and Lucian; but in respectable to the prose-writers, Plutarch and Lucian; and two great prose-writers, Financia and Duckni; but in poetry they were yet more barren than the Alexandrine period. Again, a string of lexicographers and grammarians—Julius Pollnx, Hesychins, Suidas, Photins—did valuable work on the classics. In fine, the post-classical period was critical, not creative; it cared more for matter than for form, its poetry was based on classical models, and was generally frigid and pedantic, as its learning, though spent upon the classics, was not unfrequently pedantic and puerile; in two words, its chief features are imitation and amotation.

Compositions in modern Greck have been found dating from before the fall of Constantinople, but modern Greek literature is counted to have begun after 'the conquest.' For the first three centuries, however, we do not find prose works written in the modern language. We find poetical versions of Western romanees, and we find the fumous Klephtic songs, the songs of the Greeks who, rather than submit to Turkish rule, took to the mountains and lived a life of liberty, if of brigandage. But the proso works of this period are written in ancient Greek. If the rule of the Turk produced the songs of the Klephts, the dominion of Venice allowed of the production of venues which production of the produc the production of poems which possessed more literary form though less poetical merit than the Klephtie chants. Such were the Erotorritos of Cornaro, an epie, or rather a pastoral poem, rather lacking in interest, and only occasionally relieved by a touch of imagination, and the Erophile of Chortakis, a tracely defective in form, though containing lyries of some value. In the 18th century poetry declined to a still lower level; and the honour of literature was chiefly maintained by the onour of the fittee was enterly maintained by the crudition of ceclesiastics, such as Lucaris, Miniatis, Meletios, Theotokis, Bulgaris. With the 19th century, however, began a new era in the history of modern Greek literature, and this was mainly the work of Corais (q.v.), hinself the greatest name in the era which he inaugurated. Since his time the number of authors Greece has produced in a tribition large corne matter in malera. duced is strikingly large, some writing in modern, others in 'correct' Greek. Of them we may menothers in 'correct Greek. Of them we may mention Panagiotis Sontsos, whose best work is contained in his dramas; Alexander Sontsos, the satirist; Rigas, the author of the song translated by Lord Byrou, 'Sons of the Greeks, ariso,' and of other peems which were the clarion whose notes still echoed in 1821 and first roused Greece from hor simbers; Villars, the lyric peet; Christopoulos, the Anacreen of modern Greek; Neronlos, the tragedian, distinguished for the fire of his imaginatien and the force and vigour of his diction; and last, the great scholar and still greater poet, A. R.

On the land of Greece, see W. M. Leake, Travels in Northern Greece; Wordsworth, Greece; Tozer, Geography of Greece; Lolling, Hellenische Landeskunde und Topographie. On the language, Brugmann, Grundriss der vergleichenden Grammatik der indogermanischen Sprachen; and Mullach, Griechische Yulgarsprache. On the people, Schrader, Prehistorie Antiquities (trans. by F. B. Jevons.). On the history, the works by Thirlwall, Grote, Curtius, and Finlay; Pohlmann, Grundzüge der politischen Geschichte Griechenlands; A. Holm, Griechische Geschichte; Jevons, Athenian Democracy. On the literature, books by Müller, Col. Murc, Mahaffy, and Sittl; W. Christ, Griechische Litteratur-geschichte; Jovons, History of Greek Literature; Rangabé, Histoire Littéraure de la Grèce Moderne; Dr Clon Stophanos, La Grèce au Point de Vue Naturel, Ethnologique, Démographique et Médical. See also the articles

Alphabet.
Anthology.
Art.
Athens.

Corinth.
Drama.
Government.
Inscriptions.

Music. Mysteries. Mythology. Painting.

Philosophy, Poetry. Sculpture Theatre.

Greck Architecture. The origin of what is unpularly called Greck architecture is, like the erigin of every art and science in that country, mixed up with mythical and fabulous history. It is divided into three styles, and each of these has its mythical origin. Thus, the Doric is said to have

heen copied from the early wooden huts of the aborigines; the Ionie, which spring up among the Greek colonists in Asia Minor, to have been modelled on the graceful proportions of the female figure, as the Doric had been on the more robust form of a man—the volutes representing the earls of the hair, the fluting the folds of the drapery, &c. The story of the origin of the Corinthian style is very pretty: a nurse had deposited in a basket on the grave of a departed child the toys she had annused herself with when alive. The basket was placed accidentally on the root of an acanthus, and in spring, when the leaves grew, they curled gracefully round the basket, and under a flat stone which was laid on the top of it. Callinachus, the sculptor, seeing it, caught the idea, and worked out at Corinth the beautiful capital since called after that

Modern discoveries, have, however, shown that Greece awed much to the carlier civilisation of the countries which preceded it in history, feature of Oreek architecture can be traced. But it is for the first idea only that the Greeks are indebted to Egypt and Assyria; whatever forms they adopted, they so modified and improved as to transform them into a new style. The so-called Cyclopean or Pelasgian (q.v.) architecture was wholly unconnected with the evolution of any style of Greek architecture subsequently developed. Its remains consist mainly of tombs or 'treasure. houses' -- underground chambers, vaulted with overlapping stones, and approached by a narrow passage descending to the entrance-doorway. The interior was sometimes ornamented with plates of bronze attached to the masonry. The entrance-doorway was of a conical form, the upper portion being sometimes filled with sculpture, as in the well-known Gate of the Lions at Mycene. The ancient cities and tombs of Greece have in recent years proved a rich field of research. Schliemann's excavations at Mycenic and Tiryus have brought to light a great number of specimens of very ancient art in the ferm of terra-cotta work, gold and silver smiths' work, and carved stonework. Whether native or innurted, these show a strong affinity with Assyrian and other Eastern designs. The later freek at took its rise under the Darians, after the return of the Heraelide about 1100 B.C.

Greek architecture proper is divided into three styles—the Doric, Ionic, and Corinthian (see Column, figs. 4, 5, 6). Of these the Doric is the oldest. The earliest example which remains is the

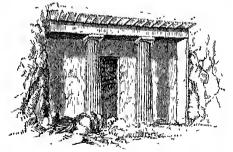


Fig. 1.

temple at Corinth, which was built about 650 B.C. The remains of this temple show the various members of the style fully developed, but they are all of a massive and heavy description, strongly resembling in this respect their prototype the architecture of Egypt. There is now no doubt, although the intermediate steps are lost, that the Dorie style

took its origin from the rock-cut tombs of Beni-Hassan (q.v.) in Egypt, of which fig. I is an existing example. The pillars of this tomb appear at first example. sight to be Doric; it is only on close inspection that we find that the echinus (see MOULDING) is wanting under the capital. The echimus was, how-ever, used by the Egyptians. We here find our-selves in the cradle of Greek art; here we must seek for the primitive elements of the style, not in Greece, where the earliest example is already complete in all its parts. There, the carlier the example, the more massive is the form. This completely disproves the theory that the pillars were copies of stems of trees used as posts. In Assyrian and Hindu architecture evidence is preserved in the forms of the bracket capitals of the wooden origin of the pillars and beams, but in Greek architecture there are no such indications. It seems more likely that the first pillars in Egypt were square piers of rubble or brickwork, with a flat stone or tile laid on the top to form a good hed for the beams to rest The lintels or architraves are short and massive, and the pillars are placed close together, as would naturally be the arrangement in stone construction. It has been supposed that the triglyphs represent the ends of wooden cross-beams resting on the architrave. But when the principles of Greek construction are analysed it becomes apparent that the triglyphs have been employed as stone supports set upon the architraves for the purpose of carrying the cornice, the nutules or spaces be-tween the triglyphs being sometimes left open, although generally filled with sculptured slabs. It is also to be observed that the triglyphs are used on the ends as well as the sides of the temple, where they could not represent the ends of cross-beams. The rafters were certainly of wood, and gave their sloping form to the pediment. It seems also likely that the ends of the rafters and projecting roof-tiles at the caves may have suggested the detailed features of the cornice with its modillions. It will, however, he observed that although the mode in which stone is employed in Greek architecture is quite appropriate for that material when the space to be spanned is small, still the principle involved is the trabeate one, or that of beam construction, which is more applieable to wooden framing than to stonework, for which the arch is the proper medium both of construction and expression. The square form of the pier may have been afterwards modified by entting off the corners, and again entting off the remaining corners, until the polygon entered the fluid clark. The game process were suggested the fluted shaft. The same process was afterwards gone through by the medieval architects in developing the piers of Gothic architecture. Be this as it may, the circular and finted form of the column had been developed before it was adopted in Greece.

After the temple at Corinth, the next remaining example is the temple at Egina (q.v.), built about a century later, or 550 B.C. There may have been many temples of the same date, but none now exist; they were probably destroyed during the Persian war, or removed to make way for finer edifices during the great building epoch of Greece which succeeded that war, and when she was at the zenith of her power. Of this epoch we have many remains. The temple of Theseus and the Parthenon at Athens (438 B.C.), those of Zeus at Olympia (440 B.C.), Apollo Epicurius at Bassa, Minerva at Sunium, and all the best examples of the Doric style of Greece are of the age of Pericles. Besides the Pelopomesus, there are the countries colonised by the Greeks to which we can look for remains of Greek architecture. The Dorian colonists of Sicily and Magna Græeia carried with them the architecture of their native country, and furnish us with many fine examples. In Selinus there

are six temples, the oldest being about the same age as that at Corinth. At Agrigentum there are three Doric temples, one of them founded by Theron (480 B.C.); this is the largest Grecian temple of the period, being 360 feet long by 173 feet broad. At Syracuse, Ægesta, and Pæstum there still remain valuable examples.

As the Doric art progressed, the early massive

As the Doric art progressed, the early massive forms gave place to more elegant and slender proportions. In the temple at Corinth the column is only 4-47 diameters in height; in the Parthenon (fig. 2), which is universally recognised as the finest



Fig. 2.

example of the style, the column is 6.025 in height; and in later examples it becomes still taller and thinner, until it turns into the opposite extreme from which it started, and becomes so meagre and attenuated as to lose entirely the boldness and vigour of design which are the chief characteristics

of the style.

One thing to be particularly admired in the Doile style is the beauty of the sculpture with which it is adorned, and the appropriate manner in which the sculpture is placed in the building, and the building suited for the sculpture. Mr Penrose has endeavoured to prove by elaborate measurements and drawings that every line was the subject of the deepest study on the part of the architect, for the purpose of correcting and allowing for all optical aberrations. The result is that there is hardly a single straight line in the huilding; all the lines which appear to be perfectly straightare drawn with accurately calculated curves, so as to produce the smoothest and most pleasing effect to the eye. Every harsh angle is softened, and every disagreeable combination of lines avoided. For example, the columns instead of straight sides have an entasis or slight swelling formed by a hyperbolic curve; the architrave of the front is curved upwards, so as to correct the optical illusion caused by the sloping lines of the pediment, and the columns are sloped slightly inwards so as to give greater appearance of solidity. It must, however, be stated that in the part of Durm's Handbuch der Architectur (1881) which treats of Greek architeetine, this extraordinary refinement of details is to a great extent denied. The Parthenon is built entirely of white marble, and the whole of the masonry in this, as in other Doric works of importance, is put together with the most perfect work-manship. There seems to be no doubt that this and other Greek temples were adorned externally with colour. To what extent this decoration was carried is not clearly ascertained; but it is probable that the exterior walls were covered with historical pictures, which were sheltered from the effects of the weather by the portico surrounding the temple. This colouring also served as a background against which the white-fluted pillars would stand well out. The sculpture was probably also relieved by a flat colour on the background, and the mouldings decorated with painted or gilded ornaments.

Ionic.—This style took its rise about 500 B.C.,

Ionic.—This style took its rise about 500 B.C., and as we have seen that the earlier Doric was

imported from Egypt, so the Ionic seems to have originated from the influence of Assyrian art. The discoveries of Layard and others have shown that many of the characteristic ornaments of the style were in common use in Assyrian architecture. The volutes of the capitals are particularly indicative of an eastern origin, the scroll being an ornament of very frequent occurrence in all eastern The finest examples of the Ionic style remaining in Greece are the temples of Wingless Victory (Nike Apteros) and the Erceltherm at Athens, built about 450-420 B.C. In the Ionian and other colonies of Asia Minor also many fine specimens of this style were erected. The celebrated Temple of Diana at Eplicsus was of the Ionie order. It was the largest temple we know of up to its time, being 425 feet long by 220 feet wide. The site was discovered and excavated by Mr Wood in 1869-74. The Ionic is a graceful and clegant style, but not so pure and severe as the Doric. The latter is distinguished by simple and beautiful ontline, enriched with the most perfect sculpture; the former trusts rather to ornamental carving for its



effect. This love of ela-borate ernament is an indication of the eastern influence under which the style originated, and the mouldings and many of the ornaments are found to be horrowed from those

of Assyrian architecture, only refined and simplified by the Greeks. The honeysuckle ornament (fig. 3), so commonly used both in Assyrian and Ionic architecture, is a good example of the improvement effected by the Greeks on the original type. In the Ionic as well as in the Doric, we find the most perfect execution and workmanship, the spirals, entasis, &c. being all drawn and out with the greatest possible exactness.

Corinthian. - This style was the latest introduced, and combines to some extent the characteristics of both the preceding. It unites and blends together the Egyptian and Assyrian elements, the cap being probably derived from the bell-shaped capitals of the former country, ornamented with the earved leaves and spirals of the East. This order was first used about the time of Alexander the Great, the earliest example extant being the Choragic Monument of Lysicrates (335 R.C.). There are also the Temple of the Winds and that of Zeus Olympios at Athens, the latter being one of the largest and linest examples of the style. The Corinthiau is the most florid of the Greek styles, and although invented by the Greeks, it was not brought into use till after the power of the ropublics, to which we owe the finest works of Greek art, had begun to wane. This style, from its richness and splendour, became afterwards the greatest favourite with the Romans, in whose hands Greek art spread over the whole empire.

Caryatides.—Besides the above styles, which

constitute the Greek orders of classic writers, the

Greeks also used Caryanaes (q.v.), of female figures, in place of columns, as in the Erechtheum; and Telamones or counts, as at Agrigentum. These were Greeks also used Caryatides (q.v.), or giants, as at Agrigentum. probably derived from the figures used by the Egyptians in their architecture, but the latter never used them as columns; they always placed them as statues in front of the columns,

Greek temples are technically classed and designated by the mode in which the columns of the porticoes are arranged. The cell, or temple preper, is a square chamber contained within four walls; the simplest form of portico is called distyle

Fig. 4.

in antis (fig. 4), the two side-walls being continued past the end-wall, and terminated with antæ, or pilasters, with two columns between. When the portice has four columns between the graph of the two columns between the antre, it is called tetrastyle. The temples have generally the same arrangement at both ends. In front of both ends of the plan distyle in untis

(lig. 5), there is frequently placed a range of six columns, and from the flank columns a row is continued along both sides, thus forming a contimous portico all round the edifice. Such an arrangement is called peripteral, and the temple is designated hexastyle and peripteral. This was a common arrangement. The Parthenon is an exception to the general rule: it has a hexastyle portico at each end of the cell, in front of which is placed an octastyle portico, and seventeen columns at each side. The seventeen columns at each side. great temple at Agrigentum had seven columns at each end, and four-

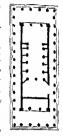


Fig. 5.

teen at each side, and was peculiar in having the space between the columns all round filled up with a wall. The reason probably was that the space between the colnums was too great to be spanned by architraves in single stones. The wall was by architraves in single stones,

pierced with windows.

Considerable doubt has existed as to the mode adopted by the Greeks for lighting the interior of their temples; that suggested by Mr Fergusson seems the most probable, as being similar to the plan used by the Egyptians and Assyrians. The interior had generally a double row of columns, one over the other, dividing the width into three spans. This arrangement still exists in the Temple of Nontang at Pastum. Parranson supposes that of Neptnne at Prestum. Pergusson supposes that the light was introduced by countersinking a part of the roof, so as to admit the light between the pillars of the upper range, thus forming a kind of clerestory, as shown on the annexed section of the

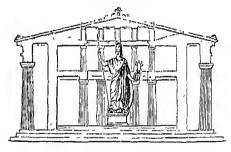


Fig. 6.

Parthenou (fig. 6). Windows, however, were also used, as in the temple at Agrigentum and in the Erechtheum.

The theatres of the Greeks formed another very important class of works; they consisted of semi-circular rows of seats cut in the rock, or partly built (see ATHENS). Remains of these structures are found in all the countries inhabited by the Greeks, and were frequently of great size—that at Dramysaus being 443 feet across. The proseenia were the parts on which architectural design was chiefly displayed; but these have unfortunately all perished.

None of the palaces or domestic edifices of the Greeks remain to us; we are thus totally deprived of a very interesting chapter in the history of domestic architecture, for it is highly probable that the houses of Greece, although not so splendid and enduring as the temples, were more varied in style, and exhibited many picturesque and beantiful forms, which are now entirely lost. But from what is known of the jealous feelings which pervaded the republics of Greece, and from the aspect of the honses in the streets of Pompeii, we may conclude that the exterior appearance of the townhouses would be quite plain and unpretending, any richness or decoration being reserved for the

interior.

The attempt was made in the early part of the 19th century to revive Greek architecture, and some ingenious modifications and adaptations of it have been carried out. But it was found that this style, so beautiful and appropriate in the warm and genial climate of Greece, was quite unsuited for our northern latitudes. The portices are useless in a climate where external painting cannot last, and where the sunshine is courted rather than excluded; the pitch of the roof is not high enough to throw off our snows; and windows of sufficient size for our dark skies are not admissible. Greeian architecture has therefore been abandoned; and its place is now taken by a style more appropriate to a northern climate, and more suited to the feelings of the people. See Fergusson's History of Architerture and other general works on the subject; Antiquities of Ionia (Dil. Soc. 4 vols. 1769-1881); Athenian Architecture (Dil. Soc. 1851; new ed. 1889).

Greek Church, THE (styled 'orthodox' by reason of its vindications of degma, and 'Eastern' from its geographical distribution), is the church of those Christians who follow the ancient rite of the East and accept the first seven councils, but do not admit papal supremacy, and reject those in-novations on the degmas and the practice of the early church which were introduced by subsequent councils in the West. She is the aged tree beneath whose shade the rest of Christendon has sprung np; and 'it is her privilege to claim direct continuity of speech with the carliest times, to boast of reading the whole code of Scripture, old as well as new, in the language in which it was read and spoken by the Apostles' (Stanley, East. Ch.). The dogmas of Christianity were first expounded by the Greek fathers; the earliest forms of Christian worship were composed by Greeks in Greek, and during the first five centuries the Eastern Church may fairly be said to have comprised the whole body of Christianity.

History.—The tendency and desire, natural to

the Eastern mind, to endeavour to estimate and define in the abstract the attributes of Deity, pushed to extremes during a time of absorbing theological controversies, brought about, in the earlier period of the church, the farmation of sects to which we shall hereinafter advert. But the great Schism between the eastern and western partions of Christendom, an event which has exercised abiding influence on the whole course of subsequent European history, was due to two primary causes—the inherent difference in the spirit and the traditions of East and West, and the transfer of the scat of empire from Rome to Constantinople.

As the Christian faith hecame predominant ecclesiastical jurisdiction necessarily coincided with civil government, so that, when the Conneil of Nicaa declared Rome, Alexandria, and Antioch to be patriarchal sees, it but recognised the political importance of those three centres of Christianity. As such, Rome was then the least Christianity. As such, Rome was then the least important of the three. Indeed the early Roman Church was a colony of Greek Christians and Grecised Jews; the first popes themselves were Greeks, not Italians, and the very name of 'pope' is not a Latin name, but the Greek designation (papas) of every pastor of the Eastern Church.

When, however, the seat of empire was transferred to Constantinople (330 A.D.), although Rome was thus deprived of its sovercignty and its countly splendonr, a signal opportunity for increase of power and self-assertion was given to the Roman pontiffs. Favoured by the absence in their diocese of theological controversics, such as distracted the East, and endowed for the most part with rare ability and worldly astnteness, they were not slow to seize upon and gradually appropriate the prerogatives and the civil authority of the absent emperors, and they soon arrogated to themselves even their pagan titles and military prestige. Constantinople, on the other hand, now rose lapidly to pre-eminence, not in the same sense of an ambitious ecclesiastical despotism, but as the official centre of a church already venerable, which had just received into its fold the first Christian emperor. A generation had hardly passed when Gregory Nazianzen (360) spoke of the city as a 'bond of union between East and West to which the most distant extremes from all sides come together, and to which they look up as the common centre and emporinm of the faith. it is true that, on the ground that 'Constantinople is the new Rone,' the second general council (381) assigned to it 'precedence of honour uext after Rome. But this declaration, and the subsequent decree of the fourth Council of Chalcedon (451), establish that these ecclesiastical honours were granned upon the political distinction only to which both cities had successively risen. Jerusalem itself, in spite of its unrivalled associations, was included amongst the patriarchates—which thus reached the number of five—only at this latter council. Yet the initial advantages which the Greek Church already possessed never disappeared; they still subsist, 'a perpetual witness that she is the mother and Rome the daughter' (Stanley). But other and irresistible inward causes militated

against the maintenance of even outward unity. Rome was destined soon to detach herself from the sisterhood of patriarchates, and renounce even that venerated title. According as the political ties between the castern and western halves of the empire grew weaker, antagonistic ideas seemed to guide the two rival sections of the church. In each the divergent genius of their pagan forerunners, no less than opposed local temperaments, reappeared with fresh vigour, and influenced both thought and action. The Greeks were still swayed, howand action. The Greeks were still swayed, however unconsciously, by the liberal tradition of democratic Hellas; while the autocratic and centralising tendency of Rome never ceased to pervade the Latin portificate. The fathers of the Greek Church inherited and christianised the philasophy of Plato and Aristotle; the Latin Church modelled its Christianity after Roman law. 'The East enacted creeds; the West discipline' (Milman). The one was controlled by a calm consequation the other was controlled by a calm conservatism, the other was impelled by a restless desire for change. The one church remained ancient and catholic in spirit; the other was transformed into a medieval and

Latin institution.

These contrasts, apparently superficial, were more deeply rooted and were fraught with weightier consequences than the outward theological differences which now mark the distinctions between other Christian churches, were such as to lead to open rupture. furthermore seemed again possessed by its tradi-tional feeling of mingled jealousy and disdain for the Greeks, who were gradually becoming supreme at Constantinople, and who finally transformed the Roman empire into a Greek monarchy. Therefore, in the disputes which followed in quick succession, political considerations weighed more in proportion as the temporal power of the popes found sustenance in the gradual growth of an independent confederation amongst the Italian

first notes of disunion were sounded in Rome, by such innovations as the enforcement of Rome, by such innovations as the enforcement of clerical celibacy (385), followed by more or less peremptory demands for the recognition, first of the hierarchical, and later of the doctrinal supremacy of the Roman pontiff, which was ultimately to be admitted as 'by divine right.' Minor changes were gradually introduced into the Western Church, such as denying to priests power to administer confirmation, and the use of unleavened bread in the encharist. These innovations the Greeks regarded as expressly designed tions the Greeks regarded as expressly designed to force upon them either a complete rapture or an unconditional submission to papal anthority. an unconditional submission to paper authority. But the chief and most abiding point of dogmatic difference consisted in the doctrine of the two-fold procession of the Holy Chost and the interpolation in the ancient creed of the church of the words Filiague ('and from the Son'). Without entering into the details of this interminable, hopeless, and bitter controversy, it may be safely said that the complete absence of such a doctrine from the deliberations of the early councils is not denied by the Latins; that popes, such as Leo III. and John VIII., admitted that its surreptitions insertion into the Creed was reprehensible; and finally, that the Greeks base their uncompromising reprobation of it on the explicit word of Christ: 'The spirit of truth which proceedeth from the Father (John, xv. 26).

Such being the abundant sources of an estrangement which steadily increased, the pope was not at a loss for pretexts in hurling his first excomat a loss for precent in lutring his list excolumnication against the emperor and the patriarels of Constantinople and Alexandria in 484. Thus the East and West were de facto separated for a period of nearly forty years. Efforts at conciliation followed, and successive excommunications were withdrawn to be renewed from both sides with dramified anima. But while the percent with intensified animus. But while the pope subordinated dogmatic differences to the recognition of his supremacy, the title of 'commenical,' which the emperor conferred on the patriarch of ('unstantimple, proved a fresh standing-block. The contest which followed (802) between the learned patriarch Photius and the popes Adrian I. and Nicholas I, was one of the most memorable periods of that long and eventful struggle, and although the so-called 'Photian Schism' was again compromised, the reconciliation proved neither cordial nor lasting. The same causes of difference, with others of a disciplinary nature, reappeared in the 11th century; and in 1054 Pope Leo IX. issued a formal excomaminitation against the patriarel Michael Cernlarius. Since that time the separation has subsisted rigidly; for although more than one attempt was made by either side to restore intercommunion between the two churches, every effort failed before the malterable demand for submission to papal supremacy and jurisdiction. Pope Gregory IX. conceded even the omission of *Filioque* by the Greeks, provided they burned publicly all books intuical to the Roman see; and the desire of many Greeks for reconciliation was so sincere that some sort of reunion might have been effected at a later time, if the old antipathies of East and West later time, if the old antipathies of East and West had not been rendered even more intense and irremediable through the conquest of Constantinople by the Latins in the fourth crusade (1204). The atrocities of this unprovoked and fanatical onslaught, which was instigated by the papal see, the ontrageous descenations of Greek churches, the horrors of the sack 'of a refined and civilised capital by a horde of comparative barbarians' (Stanley), and the cruel tyranny by which the Franks maintained their power, rendered the

existing breach irreparable. The Frank invasion. existing breach irreparable. The Frank invasion, by disorganising and weakening the Greek empire, opened the gates of Enrope to the invoids of the Thrks, whose rising power had carried before it everything in Asia. So that on his restoration to the throne of Constantinople (1261) the emperor Michael Palcolegos, pressed by dangers, was compelled, on a promise of material assistance from the West, to submit to the dictates of Rome at the Council of Lyons in 1274. When however, he Conneil of Lyons in 1274. When, however, he endeavoured, at a synod held at Constantinople, to oltain ratification of that mion, he failed to gain the assent of the body of bishops to what gain the assent of the body of bishops to what was a one-sided measure, resulting from political necessity. In the succeeding reign the breach was even more seriously widened by the councils held at Constantinople in 1283 and 1285. The last attempt at union was the one made by the Emperor John Palwologos, who, to save Constantinople, and with it the West, from the invasion of the Turks, appeared (1437) with the patriarch Joseph and several Greek bishops at the Council of Ferrara, bother known from the mace of its close as that of better known from the place of its close as that of Florence. Protracted discussions took place on all the points at issue; but while received with marks of distinction and outward show of friendship, the Greeks were, as on former occasions, deceived, out-reached, and entrapped into signing misleading and frandulent documents, with the inevitable result that, even before their return to Constantinople, they renonneed and repudiated the proceedings of what they characterised as one of the most scandalons of Roman conclaves. The capture of Constantinople by the Turks followed in 1458, and the fall of the Greek enquire removed the political considerations which alone had dictated these latter attempts at reconciliation. Thus the Greek Church may be said to have died politically, but it has never surrendered its religious heritage.

Doctrines.—As already stated, the Greek Church receives the first seven accumental councils and the cauous of the Trullan Council (from Tooghoos, the domed chamber of the imperial palace at Constantinople, where it was held). They adopt as their rule of faith not only the Bible, but also the traditions of the church 'maintained uncorrupted through the influence of the Holy Spirit by the testimony of the Fathers,' amongst whom Basil the Great, Gregory Nazianzen, and St John Chrysostom are held in general venturation as 'the three sostom are held in special veneration as 'the three hierarchs,' The Greek Church admits seven sacraments—viz. haptism, confirmation, penance, cuclarist, matrimony, unction of the sick, and holy orders; but both in the acceptation and the use of them it differs widely from the Church of Rome. Baptism is administered by a triple immersion, in accordance both with the meaning of the term itself and with the indisputable practice of the early church. Confirmation (Μύρον or Χρίσμα) follows immediately upon and in connection with haptism, even in the case of infants-again in obedience to apostolic precept. In the sacrament of Penance the church requires (a) admission before God of one's own sins, (b) faith in His merey, (c) resolve of self-nunendment: this confession to be made before a priest, (1) that he may after spiritual guidance and admonition; (2) that he may amounce to the penitent, in the name of Christ ('May the Lord absolve thee'), absolution and hope of salvation; (3) that he may recommend penitential work. 'Therefore the scandals, the influence, the terrors of the confessional are alike unknown in the East' (Stanley). As to the Eucharist, the Greeks admit the propidiatory sacrifice, the real presence of Christ, and transmistantiation, which, 'if used at all as a theological term, is merely one amongst many to express the reverential awe with which the eucharist is approached' (Stanley). They differ from the Latins in the use of leaveued bread and in the administration of communion in both kinds to all, even to children—this again in strict obedience to evangelical precept (John, vi.). Marriage is held to be dissoluble in case of adultery, but not till a probationary period has elapsed during which a bishop or priest mediates with a view to reconciliation. A fourth marriage is regarded as unlawful. Unction is administered not in catremis, as in the Latin Church, but in ordinary sickness, as laid down by St James (v. 14, 15), and is therefore called oil of prayer (Edyckatov). The sacrament of Holy Orders is celebrated by the observance of rites which have remained unchanged since the earliest times. With the exception of this last, all the sacraments may be administered by priests. The Greek Church not only reprobates elerical celibacy, but, although it has at all times favoured monastic orders, it requires that the parochial clergy should be married, so that they may not be cut off from the domesticity of the life of their flocks. Priests cannot marry after ordination, and consequently cannot contract a second marriage, nor may they wed a widow; but they must be married before ordination. Bishops are selected from the monastic orders, and are therefore single.

Monastic life originated in the East, and in countries of the Greek life numerous convents of both sexes are established, most of which follow the rule of St Basil. The rule of St Anthony (the Egyptian hermit who first instituted Christian monasticism) prevails at Mount Sinai (established 527). This monastery, Jerusalem, and Mount Athos form the three great eentres to which convents throughout the East are affiliated. According to their mode of life, moults are distinguished as (a) 'Ασκηται, if leading the ascetic existence of hermits; (b) 'λναχωρηται, when living in retiement and in separate cloisters; and (c) Κουοβιακοι, when assembled in a convent under an Ἡγούμενος or abbot. If several convents are subject to one abbot he is called 'Αρχιμανδρίτης, archimandrite; but bishops often hold the post of abbot. Nuns must either be virgins or widows, and they follow the rule of St Basil under an Ἡγουμένη, abbess. With both monks and nuns the duty of manual labour is a leading observance; the nuns, like their western sisters, apply themselves to the care of the sick and to the education of girls. But the chief glory of the Greek monastic institutions is that in them Greek learning and Greek nationality found refuge, protection, and succour during the long night of Turkish tyranny and Mohammedau persecution

Greek learning and Greek nationality found refines, protection, and succonr during the long night of Turkish tyranny and Mohammedan persecution.

Worship and Liturgy.—Fasts in the Greek Church are many and rigorous. Besides four yearly fasts—the forty days of Lent, from Pentecost to the Feast of Saints Peter and Paul, the fifteen days before the festival of the Sleep of the Theotokos (August 15), and the six weeks before Christmas—Wednesdays and Fridays throughout the year should be observed. Indulgences are not recognised; and although prayers for the dead are practised they give rise to no ecclesiastical abuse. 'A general expectation prevails that, by some unknown process, the souls of the sinful will be purified before they pass into the Divine presence; but this has never been consolidated into a doctrine of purgatory' (Stanley). The Mother of our Lord is venerated, and homage (ὑπερδουλεία) is paid to her, but such homage has never been transformed into a dogma of immaeulate conception; and the Greek Church speaks of 'the sleep' (κοίμησιs) not the 'assumption' of the Virgin. Revorence (δουλία as distinguished from ἀληθυή λατρεία, actual worship) is paid to saints, and their icons freely adorn the churches; but, with the exception of the crucifix, no graven image

is permitted. Instrumental music is forbidden in churches, but singing is universally in nse. In public prayer the kneeling posture is used only at Pentecost; at ordinary times they stand, the body being turned towards the east, and the sign of the cross is frequently made during prayers. The eeremonial of the Eastern ritual is not inferior in splendom to that of the Western, but it is more solemn and archaic; though 'organs and musical instanments are as odions to a Greek or Russian as to a-Scottish Presbyterian' (Stanley). Originally several liturgies were used in the East; but the liturgy of St James prevailed in the Greek Church. In its shorter form, as defined by St Chrysostom, it is read in churches throughout the year, with the exception of two or three festivals, when the longer version, attributed to St Basil, is said. This version is invariably used in convents. The Scriptnres are in the hands of all helievers, who are encouraged to study them in the vernaenlar, and although the idioms of some of the eastern churches into which the Bible as well as the liturgy were originally translated are now antiquated, 'the actual difference may be about that between Chancer's English and our own.'

Hierarchy in the Eastern Church is thus defined in the eatechism of Philaretus, which is in universal use in Russia: 'The four patriarchs, of equal dignity, have the highest rank among the bishops, and the bishops united in a general council represent the church, and infallibly decide under the guidance of the Holy Ghost all matters of faith and ecclesiastical life.' Thus the authority of the church is not despotic, centralised, or vested in one person. Each patriarch is independent in the exercise of his canonical authority, within his own diocese; but he is amenable to an eccumenical synod. The Greek clergy levy no tithes, claim no civil power over their flocks, and hardly possess any organisation as a separate body. 'The Eastern Church has never ruled that religious light and instruction are confined to the clergy.' And its strength 'reposes not so much on the power and influence of its clergy, but on the independent knowledge and manly zeal of its laity' (Stanley). The Eastern Church has become inactive since its subjection to Turkish rule. It is not a missionary church, and it abstains from proselytism. On the other hand, it never was intolerant, and its history has not been disgraced by persecutions, inquisition, or a St Bartholomew's massaere.

Relations with the Reformed Churches.—Owing

to these reasons the early reformers turned their eyes to the Eastern Church in hope of support and eventual union. Melauchthon was the first to address a letter to the patriarch Joseph of Constantinople, through a Greck deacon, Demetrius Mysns, who visited Germany in 1558. Another Lutheran embassy, of a more formal character, headed by the well-known Tübingen divines Jacob Andrew and Martin Crusius, visited Constantinople during the patriarchate of Jeremias (1576-81). Both missions were equally devoid of inmediate practical results. But in the following century the celebrated Cyril Lucaris, a native of Crete, was educated in Germany, and was there imbued with the tenets of the Reformers. On assuning the patriarchate of Alexandria first (1602) and then of Constantinople (1621) he opened negotiations with the Calvinists with a view to mion and the reform of the Greck Church; he corresponded with the English Archbishop Abbot and with Laud, and he presented the Alexandrian Codex (q.v.) to Charles I.; and in 1629 he issued a confession of faith of a decidedly Calvinistic tendency. But his efforts were bitterly opposed by the intrigues of the Jesuits, who brought about his deposition five times after successive reinstate-

ments in the patriarchal chair, and are supposed finally to have instigated his murder by the Turks. The innovations contemplated by Lucaris called forth a doctrinal declaration signed by the patriarchs of Constantinople, Alexandria, and Antioch, and defining the differences between the Greeks and the Reformers. This exposition was later (1672) adopted at a synod held at Jerusalem. But within our time the conciliatory spirit which animates these two branches of Christianity has found expression in practical measures of closer intercourse. In February 1872 the Greek hishop of Patras was present and delivered his benediction at the laying of the foundation-stone of an Anglican church in that town. And when later Lyenrgus, the learned Archbishop of Syra and Tinos, and the Archbishops of Corfu and of Cypuns, visited England, they cach attended Anglican services, and delivered their benediction in Anglican churches. But the most notable advance towards 'intercommunion' made in 1859, and again in 1874, when the Honse of Convocation appointed a committee 'to establish such relations between the two communious as shall enable the laity and clergy of either to join in the sacraments and offices of the other without As a first step towards this end the patriach of Constantinople issued an encyclical enjoining his clergy to bury deceased members of the Auglican Church in orthodox hurial-grounds, and to celebrate their functal rites with prayers taken from the funeral office of the orthodox church.

Sects.—The early theological controversies within the Greek Church itself, resulting in sectarianism, differ in this respect from the secessions from the Roman Church—that in the West the protest was directed mainly against abuso and ultramontanism, whereas in the East objections have always been raised against what was deemed innovation.

All the branches of the Eastern Clurch receive the first two councils, those of Nicea and Constantinople. But these two only are admitted by the Chaldrans, the earliest of Eastern separatists, whose dispute related to the meaning of evanlowness ('incarnation'). This doctrine gave rise to two distinct and opposed theories. The one accepted complete union of the human and the divine nature of Clirist, and formed the belief of the Monophysites. The other maintained a separation of the two natures, so as to deny their co-existence in one person, and rejected the term Theotokos as applied to the Virgin Mary. Such were the tenets of Nestorius, whom the third Council of Ephesus (431) condemned, and after whom the Chaldeans are also called Nestorians. This sect spread rapidly throughout the interior of Asia, and became active in missions, not only to the neighbouring Persians and Indians, but to the Bactrians and Huns, as far north as the Caspian, to Samarkand and the very confines of China, and to Socotra, Ceylon, and the Malabar coast in the south. In this last locality a remnant of the former growth and power of this church still exists. They are the Christians of St Thomas, so called either from the apostle, or more probably from a Nestorian missionary of that name. Mussulman persecution, however, and the inreads of castern barbarians have weakened, and at one time had almost annihilated, the Nestorians, who are now found principally in Kurdistan, and who believe themselves to be the lost tribes of Israel. Their sacred city is Edessa, the reputed birthplace of Abraham, and their 'catholikos' or prinate assumes the title of 'Patriarch of Babylon,' his seat having been successively removed thence to Bagdad, Mosul, and Julannerk (or Giuliamerk), where he now resides. The Nestorian patriarch is the only Eastern prelate who may marry.

The tenets of the Monophysites were condemned by the fourth exemienical council of Chalcedon (451), which established that Christ is to be acknowledged in two natures, 'invisibly and michangeably.' On this the larger portion of Syrian and Egyptian Christians, who had accepted the three former councils, secoded from the chirch, and soon broke up into three minor communities, largely through the influence of particulative.

In Syria the Monophysites were called Jacobites, from James the Apostle as they pretend, but more probably from Jacobus Baradens, the Syrian heresiarch, since the name is equally applied to the other churches of the sect. The patriatch of the Syrian Jacobites bears in succession always the hallowed name of Ignatius, and resides at Diarbekir (the ancient Amida), on the right bank of the Tigris. The country beyond was originally under the charge of the 'Maphzian ("fruit-hearer") of the East, so called from the fact that his was principally a missionary see—it is now established at Mosal. This church, like the Nestorian, was formerly widespread and flourishing, extending to more than a lumdred bishopries, of which but live now survive.

The Jacobites of Egypt are better known under their national designation of Copts (q.v.), and form the great majority of the Christian population of porthern Africa, as well as the most civilised of its native races. They have intercommunion with the Jacobites of Syria. Their patriarch, who takes his title from Alexandria, but resides at Cairo, claims jurisdiction over Jerusalem, Egypt, Nubia, Alyssinia, and the Pentapolis. He is elected by the body of bishops from candidates nominated by the four convents which possess this right. He alone has power of ordination, which is conferred, not by imposition of hands, but by the not of breathing.

or bishops from candidates hominated by the four convents which possess this right. He alone has power of ordination, which is conferred, not by imposition of hands, but by the act of breathing.

A third branch of the great Jacobite communion is the Ethiopian Church in Abyssinia, where Christianity was first introduced in the 4th century by missionaries from Alexandria. The 'abouna' or metropolitan is, under the nominal supremacy of the Coptic patriarch at Cairo, primate of the Abyssinian Church, which presents an extraordinary combination of Christian and Jewish observances. Both baptism and circumcision are deemed necessary; both the Sabbath and Sanday are observed; polygamy is permitted, though not common; and the flesh of swine is forbidden. The old controversies as to the nature of Christ still continue in Abyssinia, and Pilate, because he washed his hands of the bload of Christ, is canonised by the Ethiopian Church.

The Armenian Church, which is often considered Jacobite, because it also receives only the first three councils, is, in all essential points, much more akin to the Church of Constantinople; and, indeed, the non-united section of the communion call themselves 'Orthodox.' The absence of the Armenian delegates from the Conneil of Chalcedon was due to the internal disorders of their country, but they were definitely separated from the Greek Church in 552. The Armenians were converted to Christianity by Gregory the Illuminator, and are therefore often called Gregorians (see Armenia.). They, of all Christian churches, include as canonical Old Testament books the 'History of Joseph and Asenath,' and the 'Testament of the Twelve Patriarchs;' and in the New Testament the 'Epistle of the Corinthians to St Paul,' and 'Third Epistle of St Paul to the Corinthians.'

The decisions of the sixth arcumenical connell held at Constantinople (680) resulted in the secession of the Monothelites, whose tencis as to the one will of Christ that conneil condowned. They included the Christian population of the Lebanon, who have since been hotter known as Maronites,

from St Maro, as they allege, the Syrian auchorite of the 5th century, after whom the famous convent near Cyrus is named, but more credibly from John Moro, their first patriarch in 701. Their primate is the patriarch of Kanobin. In the 12th century, however, by the influence of the Crusaders, the Maronites submitted (1182) to the Roman Church, of which they now form an integral part.

It is essential to observe that in each of the sects and churches so described there are, almost withont exception, three divisions, resulting from the influence respectively of old traditions, nationalistic proclivities, and the Jesuit Propaganda. In each of these Eastern communions one should therefore distinguish (1) the 'Orthodox' section, with decided leanings towards the church of Constantin-ople; (2) the 'National' section, which maintains the independence of each particular heresy; and (3) the 'United' or 'Catholic' section, which acknow-

ledges the supremacy of the pope.

Uniats or United Greeks.—This last eategory forms an important fraction of the Greek Church The fall of the empire facilitated the intrigues of the Roman Propaganda, which, especially after the Reformation, endeavoured actively to seeme the submission to Rome of isolated Greek communities in the East; while, in the West, the influence of Catholic governments was brought to bear, to the same end, on the scattered Greek colonies, and on the outlying portions of the Greek Church. Thus, the numerous Greek and Greek Church. Thus, the numerous Greek and Albanian refugees from Epirus, who had settled in Sicily and southern Italy, were soon compelled to succumb; as also the indigenous orthodox populations in Anstria and Poland—i.c. the Roumanians in Transylvania and eastern Hungary, and the Ruthenians in Galicia and Little Russia. The Polish Greeks, however, who had become 'Uniats' in 1590, reverted, for the west want to the Russian Church in 1899. It is most part, to the Russian Church in 1839. It is difficult to state exactly to what degree union has thus been attained. The primary, and in most cases, the only condition, was submission to papal supremacy; all else—elerical matrimony, communion in both kinds, church discipline, rites, and lithray—being allowed to remain Greek. when circumstances were favourable, more stringent conditions were gradually imposed. And therefore the 'Unia,' as the pact is styled, is not uniform in aught else but the unremitting efforts of the Propaganda to efface the individuality of these dismembered churches.

The Four Patriarchates.—The Mohammedan in-

vasion submerged and curtailed the area, especially in Asia and Africa, over which the Eastern Church had spread; and the other vicissitudes to which reference has been made modified from time to time the extent of that area. Still, the four patriarchates claim jurisdiction within their original boundaries, with the exception of the independent states which were successively emanci-

pated from Turkish rule.
The patriarchato of Constantinople includes the whole of Enropean Turkey, Asia Minor and Pontus (Trebizond), and all the islands. The patriarchate of Antioch includes Syria, Phomicia, Isauria, and Cilicia. This patriarchate, which at one time extended its influence to India and as far as China, has suffered most from the spread of Mohammedanism. The patriarchate of Jerusalem includes the whole of Palestine, and, prior to the Saracenic conquest, was one of the most flourishing, although the one established last (451). patriarchate of Alexandria, once the most powerful and important, has shrunk, since the Mussulman occupation of Egypt, into the narrow limits of the see of that particular city.

The archiepiscopal see of Cyprus, which formed

part of the patriarchate of Autioch, was raised to an independent position by the Conneil of Ephesus (431), and its primate, though inferior in rank to the patriarchs, has precedence over all other archbishops. He enjoys the exceptional privilege of affixing his signature in red ink.

The church of Constantinople is known as 'the Great Church' (Μεγάλη Ἐκκλησία), from its ancient me-eminence as the see of the acumenical patriarch -a title conferred by the emperor on John the Faster (587) against the remonstrances of Gregory I. The Church of Antioch claims to have been 1. The Church of Antioch claims to have been founded by St Peter, and that the similar pretensions of Rome me at once more recent and less certain. The name of Christians was first given to the believers in Antioch, and to its chief paster alone the title of patriarch belongs by right. The patriarch of Alexaudria is the first Christian primate who was styled 'pope.' His other title of 'œenmenical jndge' arises from the right which the early Alexandrian Church possessed of fixing the period of Easter.

National Churches.—The anthonity which the Byzantine emperors exercised over the government of the Greek Clurch passed, with Constantinople, to the sultans. After the massacie which followed the capture of the city, and in which the patriarch had fallen with the enperor, Mohammed II, installed as patriarch George Gennadius, a Greek monk, renowned for his piety no less than for his scholarship, for which he was surnamed Scholarins.

The conrage and persuasiveness with which he expounded before the sultan the tenets of Christianity induced Mohammed to confer certain privileges on the patriarchate, enabling it to exercise a measure of authority over the orthodox church within Turkish dominions. This first concession constitutes to this day the charter regulating the relations of the church to the Porte. The patient

is elected by a synod of bishops, but the candidate must be approved of by the Porte, which also issues firmans enabling the bishops to act within their dioceses. This gives to Turkish authority so effectual a control over the church, that its having survived at all is a proof of extraordinary vitality. But the abuse and scandal consequent upon the exercise of that authority was such as to make it

the interest, both of the patriarchate and of the independent states which recognised its spiritual guidance, not to continue under a jurisdiction subjected to the sultan's will. Fortunately the constitation of the Eastern Church favoured the creation of antocephalous churches, which, while enjoying a separate internal administration, could remain

bound to the Church of Constantinople and to each

other by the unity of faith and dogma.

The Church of Russia, which alone of eastern churches presents historical continuity, was established lished when in 988 Anne, sister of the Emperor Basil, was wedded to Prince Vladimir, who was thus converted, and who at the same time ordered all his people at Kieff to be baptised in the Unicper by the Greek clergy. From that time the Christian civilisation of Russia was Greek, from the alphabet which the Greeks adapted to the Slavonic language to the baptismal names of emperors and peasants alike; and Russia recognised this debt of gratitude by the powerful protection she has extended to the eastern Christians, amongst whom she is consequently known as 'Holy Russia.' The metropolitan, residing first at Kieff and later (1320) in Moscow, was subject to the patriarch of Constantinople. In 1582, however, with the concurrence of the whole church, the patrianch Jeremiah II. raised the Russian see to a patriarchate, still dependent on Constantinople. This dependency continued till the time of Peter the Great, who in 1700, again with the sanction of the whole body of castern

patriarchs, suppressed the patriarchate of Moscow and confided the government of the Church of Russia to a synod composed of five or six bishops and a number of lay dignitaries, all appointed by the ezar, who remained supreme head of the church. In Russia there are several dissenting sects.

The Church of Georgia (ancient Iberia) dates from the time of Constantine, when Nina, a Christian of C

tian slave, converted the king and his people. It first formed part of the patriarchate of Antioch, and was subsequently transferred to that of Constantinople. But since the annexation of Georgia to the Russian empire the archbishop of Tillis has

been a member of the Russian synod.

The Montenegrins, who never acknowledged the snzerainty of the sultan, did not admit the jurisdiction of the Constantinopolitan patriarch. They diction of the Constantinopolitan patriarch. They were governed, since 1697, when they formally proclaimed their independence, by a 'Vladika' or prince-bishop of their own, chosen from the family of Petrović, and who exercised both spiritual and temporal power. In October 1851, however, Danilo I., on succeeding his nucle, the last Vladika, abandoned his ceelesiastical functions, and assumed the temporal title of hospodar or prince. bishops of Montenegro have since been consecrated by the Russian syudd.

In Austro-Hungary there are over three millions of orthodox Christians, principally of the Servian and Roumanian nationality, besides four million Uniats. Of the former, who are there known as Byzantine Greeks, about half a million are scattered through the Anstrian deminions, and the rest are in Hungary, with two archbishops (Carlowitz and Hermanustad) and eight bishops, six in Hungary proper, and two in Croatia. The archbishops exercise their jurisdiction under Austria.

In England a Greek Church has existed since the middle of the 17th century. The periodical emigrations of Greeks to the west, consequent upon oach fresh recrudescence of Turkish tyranny, resulted in the formation of a Greek colony in resulted in the formation of a treek colony in London, which must have been considerable both in numbers and position; for we find that many young Greeks were sent to Oxford, as a rule to St John the Baptist (Gloucester) Hall, where they replaced the Irish, who, after the establishment of Trinity College, remained in Dublin. A certain Nathanael Conopins, however, was at Balliol, when the first toucht the Oresi, was attended. where he first taught the Oxoniaus to make coffee, and whence he was expelled by the Puritans in 1648. When the Archbishop of Samos, Joasaph Georgines or Georgineses, had to flee from his diocese, and arrived in England about 1666, he found amongst his co-religionists in London Daniel Bulgaris as priest, but there was no church. He therefore applied to the then Bishop of London, Henry Compton, who befriended him, and who with other English bishops collected a small fund, to which even King Charles II. is said to have contributed, for the erection of a Greek church on a piece of land in Crown Street, Soho Fields, given by the parish of St Martin-in-the-Fields. (See A Description of the Present State of Samos, Nicaria, Patmos, and Mount Athos, by Joseph Georgirenes, Archbishop of Samos; Lond. 1678.) This church, which was dedicated to St Mary the Virgin's Sleep, is still extant, and a marble tablet over the west door bears an inscription in Greek rocording these facts, as well as the names then given to Greek Street and Compton Street in the same neighbourhood commemorate those events. The church, which is the one repreamongst his co-religionists in Lendon Daniel events. The church, which is the one represented in Hogarth's well-known picture of 'Noon,' soon passed to the French Protestant refugees; it was subsequently fitted up as a meeting-house for the Rev. John Rees, and in 1850 it was reconscerated as an Anglican church, to St Mary the

Virgin (Ecclesiologist, xi. 120). A copy (made about 1760) of the original register, which seems to have perished, of that first threek community London (Welbeck Street), and records the fact that when the Archimandrite Gennadius was priest in London, both the church and the community had become 'Graco-Russian.' death of Gennadius (February 3, 1737), who was buried in St Paneras Churchyard, the entries in the register record more and more frequent marriages between English and Greeks, who thus appear to have been absorbed by the indigenous element, their anglicised names which are still to be met with (Rodos, Pamphylos, Lesbos, &c.) confirming the fact. But in the beginning of the 19th century another Greek community sprung up in London by the arrival in 1818 from the island of Chios of three out of the five brothers Ralli, who Chios of three ont of the five brothers Ralli, who founded the great firm of that name, and who were soon followed by others of their countrymen. They at first met at a chapel in one of the honses in Finsbury Circus, and in 1847 built a church in Loudon Wall. As the community increased in riches and in numbers, this modest building was replaced in 1879 by a magnificent Byzantine church in Moscow Road, Bayswater, built after the model and bearing the hallowed mune of 'Hagia Sophia.' Flourishing Greek churches exist also in Liverpool and in Manchester.

In the United States there are a Greek church in New Orleans and a Russian in San Francisco. The Church of Greece offers a strong instance of the causes which militate against dependence upon a jurisdiction subject to the will of the sulfan. The Grock struggle for freedom, which carried with

it the active sympathy of the whole Greek nation, was, at the dictate of the sultan, put under the ban by the patriarch Gregorius, who, nevertheless, was soon afterwards hanged for complicity in the national cause. In the second year of the war the Assembly of the Greeks at Epidauros proclaimed (1822) the orthodox church as church of the new state, and the Royal Decree of 15-27th July 1833 organised the church on a plan similar to that of Russia, with a synod of five bishops, presided over by the Archbishop of Attica. A lay government commissioner attends the deliberations, but may not vote. The syned is the supreme ecclesiastical tribunal, and elects bishops under the confirmation of the crown. The clergy are excluded from all participation in politics, and are not eligible to sit in the legislature. In 1850 the patriarchate of Constantinople acknowledged the independence of the Church of Greece, which has already rendered to the other Grook-speaking elurches great services in the education and training of priosts. Of the large number of convents which existed in Greece, many were destroyed during the war of indopendence, and others have been utilised for educational purposes. Of those still extent the Meteora in Thessaly and Mega Spilcon in the Peloponnesus are the

most notable for extent and historical interest. The Church of Servia existed, under the early Servian kings, as an independent church, with a patriarch at Belgrade (1300). The Turkish conquest disorganised that church, and, in 1679, 37,000 Servian families emigrated to Hungary under Arsenius Czernowitz, and established the sec of Carlowitz. In 1765 the Servian patriarchate was suppressed by the Turks, and the Servian Church placed under the inrisdiction of the patriarch of Constantinople. When the semi-independence of Servia was achieved under Kara George (see CZERNY), in 1810, the government of the church was again transferred to the metropolitan of Carlowitz. Finally, in 1830, Sorvia declared her church auto-

cephalous under the Bishop of Belgrade.

The Church of Roumania is the outcome of more violent and untilial proceedings. The ecclesiastical administration of the two Danuhian principalities of Moldavia and Wallachia was originally vested in the metropolitans of Jassy and Bucharest respectively, acting under the patriarch of Constantinople.

The clergy in both principalities were almost exclusively Greek, few Roumanians having at that time either education or vocation for clerical life. The numerous conventual institutions in which they were assembled possessed immense landed estates, the bequests of Greek merchants and benefactors, who, through many generations adopted this as the only safe mode of endowing philanthropic and educational institutions within the reach of Turkish rule. Those estates, as well as others of an even greater extent and value in Russian Bessarabia (the revenues from which were sequestrated in 1873), furnished to the patriarehates of Constantinople and Jernsalem almost the only means of maintaining schools and hospitals throughout Turkey. When, however, the Moldo-Wallachians awoke to a sense of independent nationality and proclaimed the nuion of the two principalities under Alexander Couza (December 23, 1861), one of the first acts of the new Ronmanian government was to sequestrate the Greek proposition proposition was proceeded. monastic property and declare the Ronmanian Church autocephalons. It is now governed by the primate of Roumania, whose see is at Bneharest, with an archbishop of Moldavia at Jassy, and six bishops

The Bulgarians, even before their political independence, had organised, for political purposes, a clurch of their own under an exarch. The Turkish government, anxious to foment disunion between its Christian subjects, encouraged the forcible appropriation by the Bulgarians of Greek churches and schools, and sanctioned their ceelesiastical policy. As, however, canon law does not admit of the co-existence within the same diocese of two separate churches of the same faith, the patriarch of Constantinople signified his readiness to acknowledge the independence of the Bulgarian exarchate if its territorial limits were clearly defined, and if the exarch designated his see within those limits. This the Bulgarians refused to do, their avowed object being to extend their political influence through the exarchate, not only in mixed Greeo-Bulgarian districts, but even over purely Greek dioceses. A general synod of the four patriarchs was therefore convened (1873) at Constantinople, was therefore convened (1873) at Constantinople, and the excommunication of the exact late followed. The Russo-Turkish war resulted in 1878 in the constitution of an independent Bulgarian state; but its ecclesiastical head, the Bulgarian exarch, continues to reside at Constantinople and to claim jurisdiction over the Bulgarians in Thrace and northern Macedonia also. He does not conecde, however, to the patriarch of Constantinople a similar right over the Greeks in Bulgaria. The excommunication of 1873 is still maintained.

The total unmber of adherents of the Greek Church it is impossible to state precisely; the following are the only available reliable figures:

ORTHODOX GEREEKS.
Russia
(Of these about 14
million are dis- senters.)
Austria493,000
Hungary2,431,000
Greece
Roumania(about) 5,250,000
Bulgaria
Servia1,939,000
Montenegro
Turkish Empire
(approximately) 7,000,000
234

UNIAIA.
Russia
SECTS.
Nestoriaus250,000
Jacobites350,000
Maronites250,000
Armenians -
In European Turkey380,000
In Asiatic Turkey760,060
Abyssinians(about) 1,250,000

LITERATURE.—The first portion of this article is founded on Dean Stanley's admirable Lectures on the History of the Eastern Church, which have served as a basis to later treatises on the same subject. But the following authorities may also be consulted.—(1) History: Gibbon'; Robertson; Gieseler's Ecclesiastical History; J. M. Neale, History of the Holy Eastern Church.—(2) Controversics: Dorner, History of the Doctrine of the Person of Christ (in Clark's translations); Swainson, The Apostles' and Nicene Creed; Walch, Historia Controversice de processu Spiritus Sancti; J. H. Newman, The Arians of the Fourth Century; W. Palmer, Dissertations on Subjects relating to the Orthodox Communion.—(3) Councils and Common Law: Hefele, History of the Councils (Clark's translations); Photius, Nonocanon (Paris, 1615); G. A. Ralli and M. Poblis, Σύνταγμα τῶν θείων και τῶν ἰερῶν κανόνων (Athens, 1852-56).—(4) Lituyy, Ceremonics, dec. the Eastern Church, which have served as a basis to later Common Law: Hefele, History of the Councits (Clark's translations); Photius, Nomocanon (Paris, 1615); G. A. Ralli and M. Potlis, Σύνταγμα τῶν θείων και τῶν ἰρῶν κανόνων (Athens, 1852-56).—(4) Lituryn, Ceremonics, dec. E. Remaudot, Lituryiarum Orientalium Collectio (Paris, 1715-16); J. Goar, Euchologium sire Rituale Grecum (1647); H. A. Daniel, Codez Lituryiaus Ecclesia Orientalis (1853); J. M. Neale and R. F. Littledale, The Lituryias (trans. 1869); H. A. Daniel, Thesaurus Hymnologieus (Leip. 1841-56); J. M. Neale, Hymns of the Eastern Church (trans. 1868); Kımmel, Libri Symbolici Eec. Orientalis (Jena, 1843); J. Covell, Rites and Cevenonics of the Greek Church (1722); H. C. Romanoff, Rites and Customs of the Greec Russian Church (1868); Les Religions Anciennes et Modernes des Moscorites (Cologne, 1698); Mypohoyavo and Συναξεριστής, for lives of saints,—(5) Genius and Condition of the Church: D. Stourza, Considerations sur la doctrine et Pespirit de l'Eyl. Orthod. (trans. from the Greek; Jena, 1816); A. N. Mouravieff, Question religieuse de l'Orient et de l'Occident (Moscow, 1856) and Lettre à un ami sur l'Office Diriu (St Petersburg, 1850); Angeli (Ch.) Græci, De Statu hodiernorum Grecorum (Leip. 1671); Th. Sunith, De Gr. Eecl. hodierno Statu (1698); P. Ricaut, Histoire de l'Etat présent de l'Eyl. Grecque et de l'Eyl. Arménienne (1692); Helladius (Alex.) Græcus, De Statu messente Eecl. Gr. (1714); T. Ellsner, Beschreibung der Gr. Christen in der Turket (1737).—(6) Hierarchy and Dioceses: M. le Quien, Oriens Christianus (an account of the Eastern dioceses and their occupants from their foundation to 1732); Philippi Cyprii Protonotarii Constantinopolitani, Chronica Eccl. Gr. (1679); H. Hodius, De Gracis illustribus (1742); F. Cornelius, Creta Sacra, sive de Episcopis in insula Creta (Venet. 1755).—(7) Relations with the Reformars: G. Williams, The Orthodox Church and the Nonjurora (1868); Eastern Church Association Papers (1866-76).—(8) Uniuts: P. P. Rodota, Dell Origine et Stato presente del Rilo Gr. in Italia Short History of the Georgian Church (1866).

Greek-fire, a composition supposed to have been of pounded resin or bitumen, sulphur, naphtha (the principal ingredient), and probably nitre, with which, from about 673 A.D. onwards, the Greeks of the Byzantine empire were wont to defend themselves against their Saracen adversaries. The accounts of its effects are so mingled with obvious fable that it is difficult to arrive at any just conclusion as to its power: but the mixany just conclusion as to its power; but the mixture appears to have been highly inflammable, and to have been difficult to extinguish; though the actual destruction caused by it was hardly proportionate to the terror it created. It was poured out, burning, from ladles on besiegers, projected out of tubes to a distance, or shot from baliste, burning

on tow tied to arrows. The invention of this material has usually been ascribed to Callinians of Heliopolis, and to the year 608 A.D. At Constantinople the process of making Greek-fire was kept a profound secret for several centuries. The knowledge, however, of its composition gradually spread; and the use of it spread to the West. Subsisting for some time concurrently with gunpowder, it gradually died out before the advances of that still more effective competitor. Combustibles with a similar aim were used at the siege of Charleston in 1863, composed of sulphur, nitre, and lampblack; and naphtha in shells was also tried. The petroleum bombs of the Paris Commune of 1871 corresponded more nearly to Greek-

fire than does gunpowder.

Greeley, Horace, American journalist, de-ribed by Whittier as 'our later Franklin,' was born at Amherst, New Hampshire, Fehrnary 3, 1811. His father was a small farmer, always poor; and Horace, the third of seven children, after acquiring the rudiments of education at a common school, entered a printing-office as an apprentice (1826), at East Poultney, Vermont, and rose so far as to assist in editorial work on the Northern Spectator. Released from his apprenticeship in 1830 by the suspension of this paper, he worked for some time as a journeyman printer in various country offices, and in August 1831 made his way to New York with ten dollars in his pocket, and his stick and bundle over his shoulder. He and his stick and bundle over his shoulder. He had difficulty in obtaining work at first owing to the oddity of his appearance. For fourteen months he worked as a journeyman printer, when he started business along with a fellow-workman, and in 1834 commenced the New Yorker, a literary weekly paper, for which he wrote essays, poetry, and other articles. His first marked success, however, was the Log Cabin, a Whig campaign paper which contributed largely to bring about the election of General W. H. Harrison to the presidency in 1840, and which was afterwards continued for in 1840, and which was afterwards continued for some mouths. On April 10, 1841, he published the first number of the New York Tribane, of which he was the leading editor till his death. In the same year he merged his weekly papers, the Log Cabin and the New Yorker, in the Weekly Tribune, which rose to have a large circulation in the rural districts. The Tribune has been an expuest advocate of The Tribune has been an earnest advocate of temperance, co-operation, international copyright, temperance, co-operation, international copyright, a protective tariff, the abolition of slavery and capital punishment, and other reforms; was at first Whig, then anti-slavery Whig, and was finally recognised as the organ of the extreme or radical Republican party. Greeley advocated and adopted to some extent the social theories of Fourier. Among the contributors whom he gathered around the contributors when he gathered are the contributors when he gathered are the contributors when he capital contr him were such well-known writers as G. W. Curtis, W. H. Fry, C. A. Dana, Margaret Fuller, and Bayard Taylor; while he was amongst the first American journalists to recognise the genius of Dickens, Bret Harte, and Swinburne. His business faculty was indifferent, and he was easily imposed upon by impecunious people and adventurers.

In 1848 Greeley was elected to congress by one of the districts of New York, to fill a vacancy, but failed in his congressional career by agitating an unwelcome reform in the mileage payments to members. In 1851 he visited Enrope, and was chairman of one of the committees of the Grent Exhibition. He was again in Enrope in 1855. His aspiratious to political position were defeated by the more conservative party leaders, and he, in turn, is supposed to have helped the nomination of Lincoln instead of Seward in 1860. On the secession of the sonthern states from the union, Greeley at first advocated their right to secede, as being in accordance with the principles of

the Declaration of Independence; but when the war logan he became one of its most zealons advocates, rival newspapers alleging that he caused the premature advance that resulted in the defeat of the government troops at Bull Run, July 21, 1861. He published an impressive anti-slavery appeal in the Tribune, entitled 'The Prayer of Twenty Millions,' which, besides making a profound impression, drew from Lincoln a remarkable letter; and within a month thereafter the emancipation proclamation was issued. After Lee's surrender he warmly advocated a universal annesty; and his going to Richmond and signing the bail-bond of Jefferson Davis awakened a storm of public indignation. In spite of oratorical defects threeley was a good and popular speaker. In religious faith he was a Universalist. In 1872 he was an unsuccessful candidate for the presidentship, receiving 2,834,070 of the popular vote, as against 3,397,070 for General Grant; the strain proved too great for him, and he died 29th November of the same year.—A town in northern Colorado, which he helped to colonise, was named Greeley. Greeley's works include The American Conflict (2 vols, 1864-66); Recollections of a Busy Life (1868); Essays on Political Economy (1870); What I know of Forming (1871). There are Lives by Parton, Reavis, and Ingersoll, and a memorial volume (1873).

Greely, Adolphus Washington, Arctic explorer, was born at Newburyport, Massachusetts, 27th March 1844. He served as a volunteer through the war of 1861-65, and shortly after its conclusion entered the regular army as lientenant, and in 1868 was placed on the signal service. In 1881 he was selected to conduct the American expedition to the head of Smith Sound, for the purpose of carrying on observations in pursuance of the international scheme arranged at Hamburg in 1879. He and the survivors of his party were rescued in June 1883, when at the point of perishing from starvation, after spending three winters in the Arctic north. Their sufferings were so extreme that some of the party had even been reduced to eating the bodies of the dead. Lientenant Lockwood of this expedition travelled to within 396 miles of the geographical pole, the farthest point north hitherto reached. In 1887 Greely was appointed chief of the signal service, at the same time being gazetted brigadier-general. In 1886 he published Three Years of Arctic Service. See also W. S. Schley, The Rescue of Greely (1885).

Green, John Richard, historian, was born at Oxford in December 1837, and had his education at Magdalen Collego School and at Jesus College there. The atmosphero of his native city had filled him, while still a boy, with sympathetic interest in the past, but the rending of Gibbon at sixteen shaped him into a historian. His earliest writing was a striking series of papers in the Oxford Chronicle on 'Oxford in the last Century.' He took arders, and was in succession curate and vicar of two East-end London parishes, where he gave himself with characteristic maselfishness and enthusiasm to the pressing social problems around him. Yet he snatched time from his busy life to pursue his studies and to contribute historical articles to the Scaurday Review. In 1868 he became librarian at Lamboth, and next year he was struck down with an attack of consumption, a disease which darkened all his remaining years, and made any kind of active work hereafter impossible to him. Yet he toiled on with noble and uncomplaining heroism, and at last the instant popularity of his Short History of the English People (1874) instified the patience and endurance with which he had laboured to bring his work up to his own ideal.

It was the first complete history of England from the social side, and showed at once marvellous grasp of the real significance of great historic movements, fine sense of historical perspective and proportion, and startling dramatic force in the realisation of men and motives; while its style was fluent and inforced, yet ever vigorous and effective. His vast yet intimate topographical and antiquarian knowledge of England added life and truth to the English historians. The work attained an unpar-English historians, English historians. The work attained an unparalleled success, as many as 150,000 copies having been sold within fifteen years. He issued also a larger and independent edition of the work as A History of the English People (4 vols. 1877-80); Stray Studies from England and Italy (1876), the fruit of his winters in Capri; and a Short Geography of the British Islands (1879), written in conjunction with his wife, and lightened up by his genius for topography. In 1879 he received the degree of LL.D. from the university of Edinburgh. He brought out in 1880 a selection of essays of He brought out in 1880 a selection of essays of Addison, with an introduction. He also prepared for Macmillan's educational series a selection of readings from English history, in three parts, and was general editor of their well-known series of historical and literary primers. In 1881 his feeble health finally gave way, yet he continued to the In 1881 his feeble last his heroic struggle against hopeless disease, publishing in 1882 his Making of England, and leaving The Conquest of England to be edited by the pions care of his widow. His death took place in March 1883. His last two books are fragments of a projected history of England to the Conquest-a loss to our historical literature that will not soon be made good. See the admirable brief memoir prefixed to the 1888 edition of the Short History, by his wife (born 1849), herself the author of an excellent study of Henry II. (1888) in the series of 'Twelve English Statesmen.

Green, Mary Anne Everett, née Wood, was born in 1818 at Sheffield. She received an excellent education, and her enture was promoted by James Montgomery, the 'Bard of Sheffield.' In 1841 she removed with her parents to London, where in 1845 she married Mr G. P. Green, artist. Having free access to libraries and MS. collections, she edited Letters of Royal and Illustrious Ladies (1846); The Diary of John Rous (Camden Soc. 1856); Letters of Queen Henrictta Maria (1857). By appointment of the Master of the Rolls she calendared the papers of the reion of James 1, (1857-59) and born in 1818 at Sheffield. She received an excellent the papers of the reign of James I. (1857-59), and those of Charles II. (1860-68). She next completed the calendar of the state papers of Queen Elizabeth, with addenda from Edward VI. to James 1. (6 vols. 1869-74), and has since edited the papers of the Commonwealth (12 vols. 1875-88). She has also Commonwealth (12 vols. 1875-88). She has also occasionally contributed to periodical literature, chiefly on antiquarian subjects.

Green, Thomas Hill, philosopher, was born at Birkin in the West Riding of Yorkshire, where his father was rector, April 7, 1836. At fourteen he was sent to Rugby, then under Goulburn's mastership, and in October 1855 he entered Balliol College, Oxford, where he was profoundly in-College, Oxford, where he was protonnedy in-fluenced by Jowett, Conington, and C. Parker. In 1859 he took a first-class in the school of *littere* humaniores, later a third in law and modern history, and in November 1860 was elected to a fellowship in his college, and re-elected in 1872, becoming also its first lay tutor in 1866. He married a sister also its first lay theor in 1806. He married a sister of John Addington Symonds in 1871, was appointed in 1877 to be Whyte's professor of Moral Philosophy, and died after an illness of lint eleven days, March 26, 1882. By his will be left £1000 to the university for a prize essay in the department of moral philosophy, £1000 to found a scholar-

ship at the Oxford High School for boys, and £3500 to Balliol College for the promotion of higher edu-cation in large towns. Green's singularly noble character, contagions enthusiasm, and rare union at once of profundity and subtlety in philosophical speculation with strong interest in practical life and in social questions, drew around him a school of disciples that included many of the best men of his time at Oxford. His philosophy grew out of Hegelianism, but was strikingly original and vital in its form, no less than in its applications to the duties of everyday life. Thus, popular education and the spread of temperance were two objects that lay near bis heart, and he gave himself with earnestness to the business of the Schools Enquiry Commission of 1864-66, and of the Oxford Schoolboard (1874), and helped to force on the Bribery Commission at Oxford to purge the political conscience of its citizens; because the natural conclusion of his philosophy was towards an association of individuals as homogeneous co-factors in the eternal spirit; the supreme and comprehensive rule of life being the law of love which hinds men at once to human society and to God, society itself once to minimi society and to God, society usen the necessary condition for the development of personality, and religion but the highest form of citizenship. He had written but little before he contributed in 1874 his masterly introduction to contributed in 1874 his masterly introduction to the Clarendon Press edition of Hume's Treatise on Human Nature. His Prolegomena to Ethics, left incomplete at his death, was edited by A. C. Bradley (1883), and two musually pregnant 'laysermons' by Arnold Toyubee in the same year. Finally, his contraval account in Many John School, and the contraval of the same year. Finally his scattered essays in Mind and elsewhere were reverently collected, and published as The Works of T. H. Green, edited by R. L. Nettleship (3 vols. 1885-88). The first two volumes are philosophical; the third contains his miscellanies and a memoir, including an admirable discussion of his aims in philosophy, social politics, and religion.

Greenbacks. During the civil war in America, from 1861 to 1865, the immense expenditure of the United States government led to the printing of an unprecedented number of banknotes, bonds, and currency papers of various kinds. These documents, from the colour presented by them, or some of them, obtained the name of greenbacks, a designation which came to be loosely used for all United States bank-notes. The first 'demand notes' were issued in August 1861; the first greenbacks proper were of date March 10, 1862. Soon forged notes and bonds were in cir-1802. Soon forged notes and bonds were in circulation; but by degrees a large establishment was organised at Washington, nuder the immediate control of the Secretary to the Treasury, and the precautions used were such as almost completely to balic forgers. The paper currency, whose value had finetnated greatly, was declared convertible into cain on 1st January 1879, and specie parameter completely resourced. For the manufacture recognitions of the paper of the manufacture recognitions are supplied to the paper of the manufacture recognitions. payments completely resumed. For the manufac-ture of the notes from first to last, see BANK-NOTES.

The great inflation of the currency during the war, along with the heavy demand for all sorts of farm-produce, brought a period of prosperity to the western farmers, which ended with the war itself. In 1867-68 the 'Ohio idea,' as the demand itself. In 1867-68 the 'Onto idea,' as the demand for an irredecimable paper currency was called, found much favour with the Democrats, especially in the West; and in 1874 an independent Greenback party held a convention at Indianapolis and formulated its demands. In 1876 the party nominated Peter Cooper (q.v.) for the presidency; he received '97 per cent, of the popular vote. In 1880 the Greenback candidate was James B. Weaver, who polled 3:33 per cent; and in 1884 General who polled 3.33 per cent; and in 1884 General B. F. Butler was put forward, and received 1.33 per cent, of the popular vote. None of the candidates ever received electoral votes. In 1888 there was no Greenback eandidate, and most of the supporters of the party are now to be found in the ranks of the Labour party.

Green Bay, eapital of Brown county, Wisconsin, is at the head of Green Bay, and at the mouth of Fox River, 65 miles NNE of Fond du Lac by rail. The town is well built, and contains a handsome Roman Catholic cathedral. It has a good harbour, and exports humber; it has also ironworks and sawnills. Pop. (1880) 7464; (1885) 7111.

Green Cloth, BOARD OF, a committee of the royal honsehold of England, attached to the department of the lord steward, who presides over its deliberations. Its duties are to examine and passall the accounts of the honsehold, and to correct all olienders within the verge or jurisdiction of the palace, which extends to two hundred yards beyond the gates. Anciently this board had the entire management of the business of purveyance and pre-emption for the court or royal honsehold.

Greene, NATHANAEL, a famous American general, was born 6th June 1742, at Warwick, Rhode Island. His father was a leading preacher among the Quakers, and educated his son very simply, training him from childhood to work on his farm, and at his forgo and grist-mill. By his own perseverance, however, Nathanael the younger acquired considerable knowledge of ancient and English history, geometry, law, and moral and political science; he was also fond of reading books upon war. In 1770 he was chosen a member of the Rhode Island Assembly, and, to the great scandal of his fellow Quakers, was among the first to resisting the mother-country. In 1774 he cullsted as a private, and in 1775 he was appointed to the command of the Rhode Island contingent to the army around Boston, with the rank of brigadier-general. Promoted to he major-general, he distinguished himself at the engagements of Trenton and Princeton. At the lattle of the Brandywine he commanded a division, and by his skilful movements saved the American army from utter destruction; and at Germantown he commanded the left wing, and skilfully covered the retreat. In 1778 he accepted the office of quartermaster-general, retaining the right to command in the field. In 1778 he fought at Monmonth Court-house; in 1780 he foiled Clinton at the Rahway bridges, was president of the board that candenned André, and, having resigned the quartermaster-generalship owing to the delays of congress in providing supplies, was appointed to Arnold's post at West Point.

In December 1780 he succeeded Gates (q.v.) in the command of the army of the south. Gates had just been completely defeated by Commallis, and Greene found the army in a wretched state, without disciplino, clothing, arms, or spirit. By dint of great activity he got his army into better condition, and in January 1781, one of his lieutenants having nearly annihilated an English detachment, and this having drawn upon Greene the whole army of Cornwallis, much his superior in numbers, he made a masterly and successful retreat. On 15th March, having drawn Cornwallis more than 200 miles from his base, he forced on him a battle at Guilford Court-house, which resulted in a victory for the British, but one so costly that Greene was allowed to pass numolested into South Carolina. The inland portions of this state and Georgia were rapidly reconquered, and fort after fort reduced, until, at the battle of Entaw Springs, the war in the south was practically ended in what was virtually a victory for the Americans. Congress

presented Greene with a gold medal in honour of this battle, and the Carolinas and Georgia made him valuable grants of land. When peace was restored in 1783 he returned to Rhode Island, where he received numerous testimonials of the public admiration. In 1785 he retired with his family to his estate at Mulberry Grove, Georgia, where he died of sunstroke, 19th June 1786. Greene was one of the very best generals of the war of independence, second, perhaps, only to Washington, whose close friend he was. See the Life by his grandson, Professor George W. Greene (3 vols. New York, 1867-71).

Greene, ROBERT, an English poet and dramatist, was horn at Norwich about 1560. He was placed at St John's College, Cambridge, and took his degree of A.B. there in 1578. He afterwards travelled in Spain and Huly. On his return he reentered the university, and took his degree of A.M. at Clare Hall in 1583. He was incorporated at Oxford in 1588. On leaving Cambridge he pro-Oxford in 1588. On leaving Cambridge he proceeded to London, where he supported himself by writing plays and romances. He led a very irregular life, but his literary activity was ceaseles. Glad was that printer, says Nashe, 'that might be so blest to pay him deare for the very dregs of his wit.' His romances, many of which are written in Lyly's manner, are frequently tedions and insipid; but they abound in beautiful poetry. One of them, Pandosto: The Triumph of Time, supplied Shakespeare with hints for the plot of The Winter's Tale. The most popular of his plays was Friar Bacon and Friar Bungay, which has an interesting story, and (in spite of occasional layses into bonstory, and (in spite of occasional lapses into hombast) is attractively written. As Greene helped to lay the foundations of the English drama, even his worst plays are valuable in the eyes of students; but his literary fame rests on the poetry which he seattered through his romances—some of his pastoral songs being unsurpassed for tenderness and natural grace. Though his life may have been dissolute, his works are singularly free from grossness. He died of the consequences of a debauch, 3d September 1592, and was bried next day in the New Churchyard, near Bedlam. On his death-bed he sent a most pathetic letter to his wife, whom he had deserted. After his death appeared the singular pamphlet entitled The Repentance of Robert Greene, Master of Arts, in which he lays bare the wickelness of his former life. His Great's Worth of Wit bought with a Million of Repentance contains one of the few authentic contemporary almsions to Shakespeare. Chattle, in Kind-Harts Druune, describes him as of face amille, of body well-proportioned, his attire after the habite of a scholler-like gentleman, onely his haire was some-what long.' Greene's plays and poems were edited by Alexander Dyce; his complete works, in fifteen volumes, with a biography translated from the Russian of Professor Nicholas Storojenko, are included in Dr Grosart's Huth Library.

Green Earth, a mineral of a green colour and earthy character, often found filling or lining the vestendar eavities of crystalline igneous rocks, sometimes also disseminated through highly decomposed basic emptive rocks, in which it is evidently a product of the alteration of such minerals as pyroxene, amphibole, hiotite, &c. It consists principally of silica, alumina, magnesia, and protoxide of iron, the silica constituting about one-half. There are probably several minerals included under the 'green earth' of such igneous rocks. Some of these closely resemble Serpentine (q.v.) and others Chlorite (q.v.), in their general appearance.—Hauconite is the name given to the green earth which is not infrequently met with in sedimentary rocks, such as some of the sandstones

in the Cretaceous system. In such rocks glauconite occurs in the form of grains, which in many cases are casts of minute shells. The same material has been met with in the shells of recent rhizopods and in fragments of coral dredged up in deep water. There is also a green earth used as a pigment by painters in water-colours, who know it by the name of Mountain Green. For their use it is mostly brought from Monte Boldo, near Verona, and from Cyprus.

Greenfinch, or Green Linnet (Liquinus chloris), a bird of the finch family (Fringillide), a common resident in most parts of Britain, frequenting gardens and capses and enlivated districts generally. It occurs in many parts of Europe, and extends its range into Asia, also visiting in winter such regions as North Africa, Asia Minor, and Palestine. The bill is much thicker than that of the true linnets, to which, however, it is nearly allied. A prevailing green tint, mingling with gray and brown, characterises the plumage, and gives the bird its name. The female is much less brilliant and somewhat smaller than the male, which measures about 6 inches in length. The nest, usually placed in shrubs, is somewhat loosely built of fibres, moss, hair, and the like; the eggs (four to six) are greenish-white, with hrownish or gray spots; two broods are often reared in a season. The food consists of inseets, seeds, and berries. The proper song of the greeninch is not very sweet, but in confinement it readily imitates the song of other linds, and in consequence of this and of its very easy domestication it is rather a favourite cage bird. See Howard Sannders, Manual of British Birds.

Greengage, a variety of plum, of a green or yellow colour and roundish shape, the *Reine Claude* of the French, generally esteemed as one of the finest varieties in cultivation, if not certainly superior to all others. It is not of the largest size, but in delicacy and richness of flavour it is unsurpassed. Some reckon it a variety of *Prumus institia*, others as a distinct species, *P. italica*.

Greenheart, or Bebeerd (Noctandra Rodiei), a tree of the order Lauracee, a native of Guiana, of great value as a timber-tree, and also yielding a valuable medicinal bark. The timber is commonly called Greenheart; the bark is better known as Bobeeru (Bibiri, &c., or Sipiri), and its alkaloid as Bibirine or Bebeerine (q.v.). The wood is extremely strong and hard, resembling lignum-vitat. It takes a high polish. It is so heavy as to sink in water. It is remarkable for its durability, and for being almost exempt from the attacks of the white ants on land and of the teredo in water. It is much valued by harbour engineers, and is admirably adapted for all purposes which demand exceptional strength and durability. Its costliness, however, largely restricts its use, save for turning. Other species yield valuable timber, notably N. concinna, the 'Laurier marbré' of Martinque. The seeds of N. Puchury are used as a digestive tonic, and in diarrhox and dysentery, especially in Brazil; they are known as Pichurin Beans (Faba pichurim of pharmacy).

Greenhouse. See Plant-house.

Greenland, an extensive region, stretching, so far as we know, from 59° 45′ to 83½° N. lat and from 17° to 73° W. long., its north-eastern extremity, however, heing not yet accurately defined. It may be taken for proved that it constitutes an island engirt by smaller islands, but an island of almost continental size. Even its southern end has a thoroughly aretic character. It was discovered by the earliest Scandinavian settlers in Iceland. After having been sighted by Gunhjörn, it was visited by Erik the Red, who, after having explored

it, founded there in the year 986 two colonics, the Osterbygd and Westerbygd (Eastern and Western Settlements). The colonies afterwards came under the dominion of Norway, but were neglected and suffered from disaster and privation. Finally, the Westerbygd was attacked and destroyed by Eskimo Westerbygd was attacked and destroyed by Eskimo intruders from the north some years after 1340. Subsequently the connection with Europe gradually grew less and less, intil, according to obscure accounts, it wholly ceased after 1448, and Greenland almost passed into oblivion. When it was rediscovered by John Davis in 1585 the Eskimo were the only inhabitants. In 1721 the modern Panish enthemories on the work sees the great grantled. Danish settlements on the west coast were founded by Egede (q.v.) as missionary stations. During the three centuries since Davis's discoveries the During question of the site of the ancient colonics, and the possibility of remnants of a Scandinavian population being found somewhere, have been the subject of much discussion; they have even given rise to several expeditions. Remarkable ruins of undoubted Scandinavian origin were early discovered on two points of the west coast, one in the present district of Julianehaab between 60° and 61° N. lat., the other in Godthaab between 64° and 65°. In each case the ruins lie scattered over an area of some hundred square miles, occupying small flat and fertile spots around the heads of the fjords. The southern group contains about one hundred such spots, each with ruins of from two or three up to thirty houses; the northern group is much poorer. As early as 1830 it was believed that the southern ruins, though situated on the west coast, were the remains of the Osterbygd; but in 1885 it was proved finally and conclusively that no ruins of a similar description existed anywhere on the east coast of Greenland.

The part of the Greenland coast still unknown is that between Cape Bismarck in $76\frac{1}{2}^{\circ}$ N. lat. and Cape Kane in $83\frac{1}{2}^{\circ}$ N. lat., a distance of 500 miles. If this part offers no peculiar north-eastward projection, then the whole coast line may be roughly estimated at 3600 miles, or 192,000, following every island, fjord, and peninsula. The area again may be variously estimated at 512,000 and 320,000 sq. n., according as one includes or omits the islands and fjords running inland, which are 60 miles long on an average. The interior of Greenland is long on an average. of great interest with regard to physical geography in general. Owing to its size and continental character, it is the only known home on the northern hemisphere of real icebergs. Nearly half of the supposed circumference of the interior has recently been explored by a series of expeditions, whose results explain adequately how the ice-bergs are produced. It has been proved that a lunge ice-sheet covers the whole of the interior like a delage. The surface of this enormous glacier, only occasionally interrupted by protruding mountain-tops, rises slightly towards the interior. Several travellers have tried to penetrate into this unknown region, crossing the ice till they reached heights of 7000 feet; but it was not until 1888 that Greenland was crossed from east to west (by Nan-sen), when the 'divide' was found to attain some 10,000 feet above the sea. On account of this iceeap Greenland has no rivers corresponding to its magnitude; instead of its being drained by rivers, the inland ice at certain points of the coast is thrust into the sea by forces which have their origin in extensive lateral glaciers in the interior. These points are represented by the so called ice-fjords, of which six or eight of first-rate magnitude are found in Danish Greenland (between 67° N. lat. on the east coast and 75° on the west coast). of these have been narrowly explored, and it has been ascertained that the inland ice, which produces the bergs, and whose thickness may be

estimated at 1000 feet, is pushed on an average with a velocity of 50 feet in twenty-four hours into the sea, where it breaks into fragments—the bergs. The mass thus annually delivered into one of the largest class of ice-fjords would be equal in size te a mountain more than 1000 feet high and

eovering 4 sq. m.

The coast-margin that surrounds the ice-covered inland is by no means devoid of perpetual ice itself, but its glaciers are more or less isolated. It is very mountainous; bold headlands, 3000 to 5000 feet high, are common in the north as well as in the south, and some mountains even rise to a height of 6000 to 7000 feet. Low flat land is found only in small patches, especially round the heads of some of the fjords. These inlets generally take the form of narrow channels, requently more than 1000 feet deep. During the summer the whole cast coast, and the west coast up to 64° N. lat., are more or less encumbered with drift-ice from the Spitzbergen sea.

The climate of Greenland, when contrasted with

the climate of the eastern coasts of the Atlantic in the same latitude, shows a surprising difference. The sonthern point of Greenland has a mean temperature like that of the most northern shores of Iceland and Norway. But the difference consists more in the want of summer than in the severity of the winter. The following figures give the approximate mean temperature in Fahrenheit the approximate mean temperature in Fahrenheit respectively of the summer, the winter, and the year for three stations on the west coast: Lieltenan (60½° N. lat.), 44°, 22°, and 33°; Upernivik (73° N. lat.), 38°2′, -6°6′, and 13°3′; Reuselaer Harbour (78½° N. lat.), 33°4°, -28°6′, and -2°5′. The minimum observed in the north was -66°4°; the maximum in the south 68° (by the east coast maximum in the south 69°. On the east coast, in 74½° N. lat., the summor heat was about 40°, the winter - 10°; the maximum was 55°6°, the minimum - 40°4°. The mean temperature of the winter months on the west coast is very variable from one year to another, owing especially to a warm wind from south east and east.

The mountains of Greenland consist chiefly of The mountains of Greenland consist chiefly of granitie and gueissose rocks. On the west coast, between 60° 15′ and 71° 20′ N. lat., they are interrupted by high tablelands, consisting of trap and basult, accompanied by sandstone and slate, with beds of coal. The fossil flora discovered in connection with the latter exhibits 613 species, partly Cretaceous, with subtropical forms, partly Tertiary, indicating a climate like that of sonthern Europe. Metallic ores have hitherto proved rather Enrope. Metallie ores have monero processores scarce. Besides coal, different varieties of graphite but the only mineral of have been discovered, but the only mineral of real economical value hitherto made use of is cryolite, which is exported for the manufacture of sola and a very pure alum. The mine is situated at Ivigint (61° 10' N. lat.). It is worked by foreign labourers, and the export is about 10,000 tons annually. A remarkable collection of different minerals occurs in close connection with the cryolite, comprising lead and tin ore, but only in small quantities. Another peculiar group of minerals occur in connection with endialyte somewhat farther south; this mineral also has become an object of commercial speculation. A mineral-ogical rarity is finally the native iron, of which a mass found on Disco Island was estimated to weigh 46,200 pounds.

In sheltered slopes and valleys around the fjords south of 65° N. lat. copse-woods are found, consisting of alder, white birch, more rarely rowantrees, which grow to 6 or 8 feet high. The highest trees, which grow to 6 or 8 feet high. The highest birch discovered measured about 14 feet. Berries are abundant, especially crowberries and whortleborries. An attempt to grow potatoes at the south-most settlement failed. The Greenland flora

comprises 395 species of phanerogams and higher eryptogams, and 330 species of mosses.

The fauna numbers 33 species of mammalia, 124 of birds, 79 of fishes. It is from the animal kingdom, especially from the seals and whales, that the natives derive almost their whole subsi-tence. The number of these animals annually killed in the Danish trading districts on the west coast is estimated as follows: Phoca futida, west coast is estimated as follows: Phoca feedda, 51,000; Phoca vitulina, 1000; Phoca granlandica, 33,000; Phoca barbata, 1000; bladdernose seals, 3000; walrus, 200; white whales, 600; narwhals, 100; humpback whales, 1 or 2. Reindeer, of which 25,000 were shet annually in the years 1845-49, are now rather scarce. Of lish sharks only have any commercial value, but several other kinds afford for the inhalitants. A practical ships have for food for the inhabitants. American ships have for some years tried halibut-fishery on the hanks off the west coast. The dogs used for draught are of great importance in the north. A few goats and horned cattle have been kept by the Europeans, but more as a enjosity.

The inhabitants of Greenland (see Eskime) are

of the Eskimo race, more or less mixed with European blood. The individuals of the mixed race heardly differ as to language and habits from the gennine Eskimo. Besides the natives, about 250 Enropeans usually reside in the country, thirty to forty of whom have married native women. The number of natives, including the mixed race, was, in Danish West Greenland, 9648 in the year 1855, 9983 in 1886; in Danish East Greenland, 548 in 1884; the Smith Sound tribe may number 150; and lastly some few must be added for the imperfectly known north-eastern coast, where natives have been met with. The whole population in this way may appear to 11 000

tion in this way may amount to 11,000.

Since 1774 the trade of Greenland has been a royal monopoly; the service employs 2 inspectors, 30 agents and clerks, and 180 bandieraftsmen, boatswains, and laboriers, and 180 banderittsmen, boatswains, and laboriers, most of the latter being natives. There are 12 chief stations for trading and the Danish Mission; the southernmost is Julianchaab (60° 42′ N. lat.), the northernmost Upernivik (72° 48′ N. lat.). At Godthaab there is a seminary for training native catechists; of late, too, natives have been appointed pastors. The Moravian Mission has four chief stations. Since 1863 a municipal system has been tried, for which native representatives are elected by their countrythe annual export by the royal trade was 1185 tuns of oil and 40,000 skins, besides some eider-down, feathers, &c. In 1887 the imports were valued at £29,945, the exports at £26,225.

Further information will be found in Danish Greenland, by Dr H. Rink (Lond. 1877), and in the series Meddelelser om Gronland (vols. i.-xii. Copenhagen, 1879-88), which give the results of investigations since 1876. As regards the rest of Greenland, our principal sources are, for the east, the works of Seoresby, Clavering, and the second German north polar expedition; information about the north-western part is scattered over the reports of soveral well-known Arctic expeditions, especially those by Kane, Hall, Nares, and Greely. See also Nansen's account of his expedition across the interior of southern Greenland in 1888.

Greenlaw, a small town of Berwickshire (q.v.), on the Blackadder, 38 miles ESE. of Edinburgh (by rail 55). Its court-house (1834) is a large Grecian pile. Pop. 744.

Greenlet Island, a small island in the Strait of Belle Isle, in 51° 34′ N. lat. and 56° 36′ W. long., the proposed landing-place of a Canadian Atlantic cable, to extend from near Clew Bay, in Ireland.

Green Mountains, a portion of the Appalachian Range. See APPALACHIANS.

Greenock, an important seaport of Renfrewshire, the fifth largest town in Scutland, on the southern shore of the Firth of Clyde, 3\(\frac{3}{4}\) miles by water S. of Helensburgh, and 22\(\frac{1}{2}\) by rail WNW. of Glasgow. For more than four miles it stretches along the level strip of ancient sea-margin, or climbs up the slopes of the hills, which rise rapidly believed it to a height of \$13 feat, and which combehind it to a height of 813 feet, and which com-mand splendid views of the opposite coasts of Argyll and Dumbarton shires, fringed with white gleaming villages, of Highland mountains, and of the firth titself, stretching away into narrow sea-lochs, and dotted with every variety of craft. Greenock has a reputation of being always wet, and the yearly rainfall does exceed 60 inches; but as the prevalent nament does exceed of menes; but as the prevalent winds are from the south and west, they are generally mild. The west end of the town, with its elegant and commodious villas of every style of architecture, its beautiful esplanade 1½ mile long, its wide and well-paved streets, planted with trees, is particularly attractive. The public buildings are many of them very handsome. The chief among these is the town hall some automatical buildings. these is the town-hall and municipal buildings (1886), Renaissance in style, with a tower 245 feet high; then come the county buildings (1867), the constom-house (1818), the poorhouse and lunatic asylum (1876), Wood's Mariners' Asylum (1851), the temperance institute (1870), the Y.M.C.A. Institute (1887), and the Watt Institution (1837), containing a marble statuc of Watt by Chantrey. There are several handsome churches. To Sir Michael Shaw-Stewart the town is largely indebted for the Well Park (1851), the Wellington Park (1872), and the Lyle Road (1880). The new cemetery, 90 acres in extent, with its Watt caim, and the magnificent water-works (1827-83) also deserve mention. The harbour-works date these is the town hall and municipal buildings also deserve mention. The harbour-works date also deserve mention. The harbour-works date from 1707, and have eost upwards of 1½ million pounds. Accessible at all states of the tide, they include Victoria Harbour (1850), the Albert Harbour (1866), and the James Watt Dock (1886). The tonnage of vessels belonging to Greenock rose from 29,054 in 1825 to 103,919 in 1867, and 229,912 in 1888 (besides 306 fishing-boats); whilst the tonnage of vessels entering the port ranges between 1 and 1½ million per annum. Shipbuilding has been carried on since 1760; and duning the twelve years 1876-87, the tonnage of vessels built here (mostly iron or steel steamers) varied from 14,500 in 1877 to 52,744 in 1882. Sngarrefining, commenced in 1765, in spite of bad recent years has still its chief seat at Greenock; and there are also manufactures of steam-engines, anchors and chain cables, ropes, salicloth, paper, wool and worsted, &c. Since 1832 Greenock has returned a member to parliament. Pop. (1696) 1328; (1801) 17,190; (1851) 36,689; (1881) 66,704; (1889) 78,248. Created a burgh of barony in 1635, Greenock owes its growth from a mere fishing-village to the Shaw family and to the Treaty of Union (1707), by which free commerce was opened up with America and the West Indies. Besides being the birthplace of the West Indies. Besides being the birthplace of Watt, of Spence the mathematician, and of Principal Caird, it has memories of Rob Roy, John Wilson, and Galt, and contains the grave of Burns's 'Highland Mary.' See Provost Dugald Campbell's Historical Sketches of the Town and Harbours of Greenock (2 vols. 1879-81).

Greenough, HORATIO, an American sculptor, was horn in Boston, 6th September 1805, studied for two years at Harvard, and from 1825 spent the greater part of his life in Italy. His principal work and one received heath for account and for work, and one remarkable both for accuracy and for lofty conception, is the colossal statue of Washington, whieli now stands in front of the national

capitol building. Other important sculptures are his 'Medora,' 'Venns Victiix,' and a group of four figures, 'The Rescue,' for the purpose of placing which he returned to America in 1851. He died at Somerville, Massachusetts, 18th suddenly December 1852.

Green Pigments. These are numerous and some are very important. Several of them are mechanical mixtures of blue and yellow; a larger number are chemical compounds which are naturally green; but of either kind only a few are extensively used. All those which are serviceable or have any special interest are noticed in what follows.

Sup green is the only one of vegetable origin that need be mentioned. It is prepared from the gunny juice of the berries of a species of buckthorn (Rhamnus catharticus), and is a fine transparent yellowish-green. It is unfortunately fugitive, but is occasionally employed in water colour painting.

Terra verte is a kind of ochre. This pigment is much used by artists for painting in oil, being one of the most permanent greens. It has not much body, but can be mixed with other colours without

injurions results.

Oxide of chromium, like the last, is found native, but for use as a colour it is always artificially prepared. It is a sober, permanent green much liked by some landscape-painters. Viridian and Veronese green are also oxides of chromium, but the latter is often adulterated with assenic.

Emerald green (enpric aceto-arsenite).—This very hright (but poisonous) green, also called Schweinfurt green, is only employed to a limited extent by artists and decorators, but is used for other purposes. It is fairly permanent.

Scheele's green (cupric arsenite) is another bright green, although not so vivid in colour as the last, which it resembles in stability and in other properties. This is a dangerous pigment, and is unfortunated to the properties. tunately a good deal employed for colouring paperhangings, artificial leaves, and toys.

Brunswick Green.—Several distinct pigments are known by this name. One of the kinds employed by the honse painter is a basic carbonate of copper, nixed with gypsum or other bodies. It is fairly permanent. Mountain green, mineral green, and

permanent. Mountain green, inmeral green, and malachite green are also carbonates of copper. In chemical books Brinswick green is usually said to be the oxychloride of copper. Chronic green, noticed below, is likewise called Brinswick green. Rinman's green, known also as zinc green and cobalt green, consists of 88 per cent. of oxide of zinc and 12 per cent. of protoxide of cobalt. This colour is permanent, and is not affected by strong heat. heat.

Chrome green is a mixture of chromate of lead and Prussian blue. It is a bright, strong colour, and is suitable for ordinary mechanical painting. It is, however, not permanent; a more durable green, but one of less power, being formed with French ultramarine and chrome yellow.

Hooker's green is a mixture of Prussian blue and

gamboge, and possesses some permanence as a water-colour. Prussian green is formed in the

same way, but contains more blue.

Greens which are compounds of copper are all more or less poisonous even when they do not also contain arsenie.

Artists generally prefer to make up the shade of green they require by mixing blue and yellow pig-ments for bright shades, and blue and brown colours for dull shades. As a rule the green portions of pictures have stood the effects of time worse than other colours.

For the materials used in dyeing textile fabrics green, see Dyeing and Calico-printing; and for green colours used in painting or printing pottery, see POTTERY.

Green River (1) rises in Western Wyoming, flows south-east into Colorado, and then south-west and south through Utah, joining the Grand River after a course of some 750 miles.—(2) Green Chief the State of the Colorado of t River, Kentucky, rises near the centre of the state, flows west and north-west, passing near the Mammoth Cave, and crosses the northern boundary, entering the Ohio 9 miles above Evansville, Indiana. It is about 350 miles in length, and is navigable for small steamers for 150 miles; its lower course is through the coalfields of Western Kentneky.

Greenroom, a room near the stage in a theatre, so called because originally painted green, where, during a performance, the actors wait while off the stage.

Greens, the common name of all those varieties of kale or eubhage (Brassica oteracca) which do not boll, and of which the leaves are used for the table as boiled vegetables; some of which are also called colewort, &c., whilst others, particularly those with eurled leaves, as German greens, have no other name than greens or kale. Young unbolled cablages, and shouts from the stocks of cabbages, are often also called greens, as well as turnip-tops, and other leaves of plants used in the same manner.— The leaves of German greens are very much waved or earled. This herb is one of the best kinds of onen greens. It is either sown in spring and planted out soon after, or it is sown in autumn and planted out in spring.

Greensand, the name given to two divisions of the Cretaeeous System (q.v.). They are so called from the occurrence in some of the strata of numerous small green speeks of glauconite (a hydrons silicate of iron, alumina, and putash; see Green EARTH), sometimes so abundant as to give a green eclour to them. The term is, however, far from being descriptive of the various included strata; it must be considered simply as a name. must be considered simply as a manner districts, especially on the Continent, the green districts, especially absent from the strata. The particles are entirely absent from the strata. The petrographical character of the Upper Greensand is so like that of the Lower, that it is scarcely possible to separate them when the intermediate Could in about a possible to separate Gault is alreat, except by their organic remains, which are very distinct; so much so, indeed, as to have caused the placing of the one series in the Lawer Cretaceons group, and the other in the

Upper The Upper Greensand consists of beds of sand and sandstone, generally of a green colour, with the sandstone of calcarcons grit, beds and concretionary masses of calcarcons grit, called firestone, and chert. In the Wealden district the average thickness of the formation is about 60 the average thickness of the formation is about 60 feet. It is only doubtfully present north of Folkestone; in Sussex it reaches 20 feet, and in the Isle of Wight 100 feet in thickness. This formation is supposed to have been a littoral or shore deposit of the cretaceous sea. While the chalk was being deposited out at sea these sands were being laid down along the shore contemporaneously with the chalk, although they appear inferior to it. Their position would necessarily result from the cretaceous sea widening its area; as the shore was submerged the greensand became covered with the chalk, and thus appears as an older and underchalk, and thus appears as an older and underlying deposit. The beds of this series are rich in fossils, abounding especially in the remains of

sponges, inallusen, and celinodermata.

The Lower Greensand consists chiefly of yellow, gray, white, and green sands, but includes also beds and bands of clay, limestone, and ironstone. It attains a thickness of 500 or so feet. The sands preponderate in the upper, and the clays in the

lower portion of the formation. In Surrey, Kent. Sussex, &c. it is subdivided as follows:

4. Folkestone beds,

Bandgate beds.
 Hythe beds.
 Atherfield clay.

Some beds of clay of considerable thickness, occasionally as much as 60 feet, are used as fuller's earth,
The ealeareous stone is a highly fossiliferous hand of limestone, locally called Kentish rag, much used for building in Kent and Sussey. The formation was formerly known as the iron-sand, because of the sands being cemented together hy an abundance of oxide of iron; this gives them a reddish colour. The Lower Greensand contains numerous fossil mol-Insca and other remains. It is a marine deposit, and rests on the fresh-water Wealden strata, showlusea and other remains. ing that while it was being accumulated the sea made considerable encroachments on the land. In the Iste of Wight the strata are well developed, reaching a thickness of some 800 feet. In the Midland counties the same beds are recognised and have assumed various names, such as 'Faringdon heds,' 'Shotover sands,' 'Woburn sands and Wicken beds.' The Tealby series is the name given to the Lower Greensand beds of Lincolnshire. Near Flamborough Head the Lawer Greensand and Wealden beds are represented by the Specton clay.

Greenshank (Totunus canescens), a bird of the sinpe family (Scolopacida), in the same genus as the redshank and some of the sandpipers. It is about the size of a woodcock (14 inches in length),



Greenshank (Totunus cancscens).

but has much longer legs; the general colours of the plumage are brown and gray, the latter prevailing in winter, when the under surface is pure white; the bill is about 2 inches long; the tail is short. The greenshank nests on the ground, which the eggs (four) more or less resemble in colour; when disturbed the bird behaves and eries very much like a lapwing. The food consists of small animals of all sorts. In spring and antunin small flocks occur on the British coasts or by inland lakes; in Ireland it often winters, and in the north of Scotland may even breed. Its general range is virtually co-extensive with the castern hemisphere. See Howard Saunders, Manual of British Birds.

Arcen Sickness. See Chlorosis

Greenstone, a rock term (now disnsed) for any dark green basic crystalline 'trap-rock.' The greenish tint which such igneous rocks so frequently show is now recognised as being in most eases due to the presence of serpentine, chlorite, or other products of decomposition. Most greenstones are thus

referable to the Basalts (q.v.) and the Diorites (q.v.).

Greenville, capital of Greenville county, South Carolina, on Reedy River, 95 miles (143 by rail) NW. of Columbia, with a cotton faetory, and manufactures of oil, flour, furniture, and machinery. It is the seat of a Baptist university (1851) and of a Baptist ladies' college. Pop. (1880) 6160.

Greenweed, a name given to certain half-shrubby species of Genista. See GENISTA, and Dyer's Broom (G. tinctoria) under BROOM. Hairy Greenweed (G. pilosa) is sometimes grown in France on light soils as fodder for slicep.

Greenwell, Dora, religious poet, was born 6th December 1821 near Lanchester in Durham, and after 1848 lived in Durham. She died 29th March 1882. Amongst her works, all marked by a lofty strain of patience, Christian hope, holy confidence, and withal of deep-seated melancholy, are a volume of poems in 1848, and another in 1861; several short prose works, including The Patience of Hope, Two Friends, and a sequel, Colloquia Crucis; a Life of Lacordaire (1868), and Carmina Crucis (1869). See the Memoirs by William Dorling (1885).

Greenwich (A.S. Green wie, 'green creek or bay'), a parliamentary borough of Kent, is situated 5 miles ESE, of London Bridge, on the south bank of the Thames, here crossed by a steamship ferry, on the American system, which was opened in 1888. The town is chiefly memorable on account of its great national institutions. First amongst these comes Greenwich Hospital, which occupies the site of an old royal palace, in which Henry VIII. and his daughters Mary and Elizabeth were born, and where Edward VI. died. The first idea of its foundation is said to have originated in 1692 after the great naval victory of La Hogue; it was then proposed to raise a suitable monument as a mark of the gratitude which England felt towards her brave sailors. According to the towards her brave sailors. According to the Latin inscription which runs round the frieze of the hall, 'The pions regard of Queen Mary dedicated this Palace of Greenwich for the relief and maintenance, at the public expense, of those seamen who have protected the public exfert is the men who have protected the public safety in the reign of William and Mary, 1694.' The hospital consists of four distinct piles of buildings, all of which are quadrangular and named according to the respective sovereigns in whose reigns they were successively built. King Charles's building, to the west, was erected in 1604, from the original design by Inigo Jones. On the other side of the square towards the cast is Queen Anne's building; square towards the cast is Queen Anne's binding; to the southward of these are King William's building, containing the Great Hall, and Queen Mary's building, containing the chapel. The last three were from designs by Sir Christopher Wren. The Great Hall is remarkable for its painted ceiling, a work carried out by Sir James Thornhill in 1707-27. It contains several valuable pictures of great record to the larges who fought great naval battles and of the heroes who fought in them; there is still preserved the coat which Nelson wore when he was shot at Trafalgar. The chapel is a fine specimen of Greek architecture; it was restored in 1789 from designs by James Stuart. A statue of George II. by Rysbrach Stuart. A statue of G adorus the central square.

The first pensioners were received in the hospital in 1705; these numbered 100; in 1814 the maximum number was reached—viz. 2710. In 1763 outpensions were granted from the funds; in 1849 the number of in-pensioners began to decrease, nntil in 1865 they only numbered 1400. For some time the in-pensioners had been discontented with their manner of living at the hospital, and in 1869, when they had the option of receiving a grant of money

in lieu of their board and lodging, a very large majority preferred to take the money and go to their friends. A few old or bedridden men were transferred to the various naval hospitals and the Seamen's Hospital Society, to be maintained at the expense of Gicenwich Hospital Fund. Greenwich Hospital was thus discstablished by the votes of the very men for whose benefit it was originally founded. The revenues of the hospital are derived from different sources, the principal of which are gifts by King William and the original commissioners, the rental of the forfeited estates of the Earl of Derwentwater, contributions of the sea-men and marines of Her Majesty's fleet, as well as from those who served in the mercantile marine; large sums have been acquired from unclaimed prize-money and fines. The annual income of the prize-money and fines. hospital is £167,259. From this sum numerous pensions are paid; 1000 boys, the sons of seamen and marines, are maintained and educated at Greenwich Hospital Schools at an average cost of £23,000 a year; gratuities are granted to widows of seamen and marines; and 50 children of officers who have died receive grants for their education.

It is estimated that 9000 persons, exclusive of the children mentioned, derive benefit from the funds. In 1873 Greenwich Hospital became the college for the Royal Navy, and all naval officers belonging to the combatant branch are now compelled to take their degree at Greenwich. Having reached a certain sequipling to the results in a mid-binuous there are entered to the contract of the contrac certain seniority as midshipmen, they are entered at the college, and, after having passed through a course of instruction, they are examined and classified according to merit. Executive officers of different ranks have the privilege of studying and earning extra distinctions by passing meritorious examinations. A certain number of the engineer officers also go through a course of study at the Royal Naval College.

The Naval Museum contains many objects of interest connected with the navy, such as models of ships both ancient and modern, specimens of guns, tarpedoes, and ammunition, plans of British dockyards, relies of Sir John Franklin's expedition, and, last but not least, the famous original Chatham elest—established at Chatham by Queen Elizabeth in 1588 for the relief of wounded and decayed seamen, and removed hither in 1803.

The Royal Hospital School was first established in 1712 for the purpose of clothing and educating the sons of the pensioners. One thousand boys enjoy its benefits, besides one hundred day-scholars nominated under the Boreman Trust. Eatries are made at 11 years of age, and, if the boys prove fit for service in the navy, they are retained till they reach the age of 15½ years. The school is essentially a training place for the Royal Navy, the boys being passed thence to training-ships at Portsmouth and Devonport. The 'Queen's House' in the centre of the school buildings was a favomite residence of Queen Henrictta Maria. The school possesses a spacious gymnasium, a large swimming-bath, several good model rooms for seamanship instruction, and a very fine dining-hall. The admissions are limited to the sons of seamen of the Royal Navy, the Royal Marines, and the Royal Navyl Reserve, with a few from the mercantile marine.

Another national institution at Greenwich, not less important than these naval establishments, is the Royal Observatory, which crowns the hill that rises in the park belind the hospital (see OBSERVATORY). It was built by Charles II. in 1675, the first astronomer-royal being Flamsteed. From here the correct time is flashed every day by the electric telegraph to the principal towns of the kingdom. From Greenwich, too, geographers and seamen reckon longitude. The park is a favourite

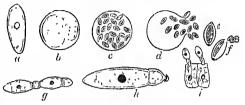
resort of Londoners ou Sundays and holidays. The Whitebait (q.v.) Dinner, a banquet held by the cabinet-ministers to celebrate the termination of a parliamentary session, is held at Green-wich, which is famous for the fish from which the dinner is named. Greenwich is well supplied with eharitable institutions, chief among which may be mentioned the Jubilee Alusheuses, Norfolk or Trinity College, Roan's Charity, the Green-coat and Blue-coat Schools. The manufacturing establishments of the town include engineering, telegraph works, chemical works, &c. It returned two members to parliament down to 1885, when the new parliamentary boroughs of Deptford and Wool-wich were formed out of its boundaries, and it was restricted to one member. Pop. (1861) 40,002; (1881) 46,580. See the Rey. A. G. L'Estrange, The Palace and the Hospital: Chronicles of Greenwich (2 vols, 1886).

Greg, WILLIAM RATHBONE, author of several works in literature and politics, was born in Manchester in 1809, became a Commissioner of Customs chester in 1809, became a Commissioner of Customs in 1856, and acted as Controller of Hor Majesty's Stationery Office from 1861 to 1877, when he resigned. He died November 15, 1881. He was a man of profoundly earnest character, had a conspicuous power of incisive writing, and was interested in many philanthropic measures. In his Rocks Ahead he took a highly pessimistic view of the future of England, and regarded some present tendencies as pregnant with dauger, anticipating with foreboding the political supremacy of the lower classes, the approaching industrial decline of lower classes, the approaching industrial decline of the England, and the divorce of the intelligence of the country from its religion. His works include The Ureed of Christendom (1851); Essays on Political and Social Science (1854); Literary and Social Judgments (1809); Political Problems (1870); Enigmas of Life (1872); Rocks Ahead, or the Warnings of Cassandra (1874); Mistaken Aims (1875); Miscellancous Essays (2d series, 1884).

Gregarinida, or Sporozoa, a class of parasitic single-celled animals or Protozoa, the members of which are predominantly passive. As adults they are entirely destitute of cilia or other locamotor are entirely destitute of cilia or other locamotor structures, and emphasise in their history the encysted phase of cell-life. They are found in almost all kinds of animals, inside the cells, or loose in the alimentary canal, hody-cavity, and other spaces. The food consists of the diffusible albuminoids of the host, absorbed by the general surface of the 'mouthless' unit. The Gregarino is wholly surrounded by a rind, and sometimes shows fibril-like, probably contractile, structures; there is a large spherical uncleus, but no contractile vesicle. They vary greatly in size, from minute forms which live within blood corpuscles to others visible to the unaided eye, and measuring somevisible to the maided eye, and measuring sometimes 'to the maided eye, and measuring sometimes 'to the fan inch. A typical life-history is indicated in the diagram, the important points being as follows: in early life the Gregarine usually lives inside a cell, whether it keep this habitat or not; the young forms not unfrequently divide; Characterians are food of agreeithing in capable (c) Gregarines are fond of associating in comples (or even in trios), but this union does not seem to be usually followed by fusion; at a certain stage the unit, or sometimes the pair, becomes en-eysted and divides into numerous clothed spores; each of these, when liberated by the bursting of the eyst, gives origin to a young Gregarine, or usually to several; these are at first flagellate or amodoid, or at least more active than the adults, but with nutrition and growth the juvenile activity is soon lost.

Among the most important Sporozoa are the following: Monocystis, represented by at least two species in the male organs of the earthworm;

Gregarina, a type of those with the body divided by a partition, and furnished with a curious, anterior, proboseis-like appendage, found in the alimentary caual of crustaceans and insects—e.g. lobster and cockroach; Klossin, in molluscs, espeeially cuttle-fish; Drepanidium, in frog's blood, a



Life-history of Gregarine :

a, common adult type, showing rind, nucleus, and protoplasm; b, two individuals within a cyst; c, the formation of spores, usually several within each little case; d, the escape of the spore-cases by suptime of cyst; c, an enlarged spore-case, showing two enclosed spores; f, a young individual or spore, escaping from its spore-case; g, two diegatines united end to end; h, an adult, showing attaching anterior portion and the slight partition dividing the cell; i, two young Gregarines emerging from the cells in which they have spent their early life.

type of many with a similar habitat in birds and roptiles. Vory imperfectly known are the Myxosporidia found in fishes—apparently very primitive forms—and the Sarcosporidia in the musclefibres of mammals, of which Sarcosystis ('Miescher's vesicles' or 'Rainey's corpuseles') is common, but apparently harmless in butcher-meat. Coccidium oriforme is definitely known as a Gregarine parameter in many

See Cell, Parasitism, Protozoa; also Bitschli, 'Protozoa' in Bronn's Thierreich; Balbiani, Leçons sur les Sparonaires (Paris, 1884); Louckart, Parasites of Man (Edin. 1886); Laukester, art. 'Protozoa' Encycl. Brit.; Schneider, Tablettes Zodoniques (1886, &c.); Ilatohett Jackson's ed. of Rolleston's Forms of Animal Fig. (1964), 1882). Life (Oxford, 1888).

Grégoire, HENRI, the most remarkable among the so-called constitutional hishops of France, was born of poor parents at Vého, near Lunéville, December 4, 1750. Educated by Jesuits at Nancy, he took orders, and lectured for some time at the Jesuit College of Pont-à-Mousson. His Essa sur la Régénération des Juifs (1778) breathed Essa sur la Régénération des Juys (1778) breatnet the toleration that was in the air, and because widely popular. Becoming curé of Emberménil, he was sont to the States-general of 1789 as one of the deputies of the elergy. He was an ardent democrat in all his views, and, attaching himself from the first to the Tiers-état party, acted a prominent part throughout the grand drama of the Revolution. One of the secretaries of the National Assembly, he supported enthusiastically the abolition of the he supported enthusiastically the abolition of the privileges of the nobles and clergy alike, and the civil constitution of the clergy. He was the first of his order to take the oaths, and was elected the first 'constitutional bishop' of the department of Loir-ot-Chor, which he accepted, although the old and legitimate bishop, Monseigneur de Thémines, was still alive. Crégoire earried into overy department. ment the stern democracy to which he was devoted, and which he identified with the Christian brother. hood of the gospel; and upon the fundamental doctrine of the Revolution—the rights of man—he sought to ingraft his own early advocacy of the Jews and of the negroes, and especially the doctrine of the duties of man. At the blasphenous Feast of Reason, the weak Gobel, constitutional Bishop of Paris, publicly renounced Christianity; but Grégoire faced the infuriated rabble with all the courage of the primitive martyrs, and refused to deny his Master. After the 18th Brumaire he became a member of the Corps Legislatif.

extreme republicanism was highly distasteful to Bonaparte, and it was only after a third attempt that he was appointed member of the senate. On the conclusion of the concordat between Pius VII. and Bonaparte he ceased to exercise ecclesiastical functions, being unable conscientiously to give the netractations required by the church, and he died without reconciliation at Autcuil, near Paris, 28th without reconcination at Auteuil, near Paris, 28th May 1831. His Mémoires were edited by H. Carnot, with a life (1831). Of his numerons withings may be named Histoire des Scotes Religiouses (1814); Essai historique sur les Libertés de l'Église Gullicane (1818). See the studies by Krüger (Leip. 1838) and Bohringer (Basel, 1878).

Gregorian Calendar. See Calendar. Gregorian Tones. See Plain song.

Gregorovius, Ferdinand, a distinguished German historian, born in East Prussia, 19th January 1821. He studied theology at Königsberg, but soon devoted himself to poetry and literature. berg, but soon devoted himself to poetry and literature. In 1852 he went to Rome, where he subsequently spent most of his time. His great work is the *History of the City of Rome in the Middle Agas* (8 vols. 1859-72; 3d ed. 1875). He has written also on Italian geography and history, on Corsica (1854), Capri, and Cortu, on the graves of the popes (1857; 2d ed. 1881), on Lucieza Borgia (1874), on Urhan VIII. (1879), on Athens (1881), and on the Evantine empress. Athenais (1882): and on the Byzantine empress, Athenais (1882); also a tragedy on the death of Tiberius (1851), and an epie, Euphorion (4th ed. 1880).

Gregory, the name of sixteen popes, of whom five were specially noteworthy.

Gregory I., The Great, a father and saint of the Roman Catholic Church, was born in the city of Rome about the middle of the 6th century. father Gordianus was a senator of the same family as that to which Pope Felix III. had belonged, and his mother Sylvia was famed for her surpassing was rained for the surpassing virtues. At a comparatively early age Gregory was appointed by the Emperor Justin II. to the important charge of pretor of Rome; but he voluntarily relinquished this office, and withdrew altogether from the world into a monastery at Rome, one of seven he had founded. 'He lavished on the poor all his costly robes, his silk, his gold, to himself the abbaey of his convent, but beginning with the lowest monastic duties, he devoted himself altogether to God.' This was probably about 575. It was while here that he saw one day some fair-haired Anglo-Saxon youths in the slave-market—'non Angli sed angeli'—and was seized with a longing to dovote himself to the conversion of their country to Christ. He set forth on his journey, but the elamour of the Romans at his loss led the pope Benedict to compel his return, and eventually to enrol him in the secular ministry by a calcular with the country of th by ordaining him one of the seveu Regionary Deacons of Rome. Benediet's successor, Pelagius II., sent Gregory as nuncio to Constantinople, to implore the emperor's aid against the Lombards. He resided three years in Constantinople, during which time he commenced, and perhaps completed, his Moralia, an exposition of Job. On his return to Rome he resumed his place as abbot of his monastery, and on the death of Pelagins, in a plague which laid waste the city, was manimously ealled by the elergy, the senate, and the people to succeed him. He used every means to cyale the dignity, even petitioning the Emperor Maurice to withhold his consent, but was forced to yield, and was consecrated September 3, 590.

Few pontiffs have equalled, hardly one has surpassed, Gregory I. as the administrator of the multiplied concerns of the vast charge thus assigned to him. 'Nothing,' says Dean Milman, 'seems too

great, nothing too insignificant, for his earnest personal solicitude; from the most minute point in the ritual, or regulations about the papal farms in Sieily, he passes to the conversion of Britain, the extination of simony among the clergy of Gaul, negotiations with the armed conquerors of Italy, and the revolutions of the Eastern Empire. There is no department of ecclesiastical administration in which he has not left marks of his energy and his greatness. To him the Roman Chmeh is judebted for the complete and consistent organisation of her public services and the details of her ritual, for the regulation and systematisa-tion of her sacred chants. The mission to England, which he was not permitted to undertake in person, was entrinsted by him, with all the zeal of a personal obligation, to Augustine; and, under his auspices, Britain was brought within the pale of Christendon. Under him also the Gothic king-dom of Spain, long Arian, was reconciled with the church. Nor was his zeal for the reformation of the elergy, and the purifying of the morality of the church, inferior to his ardour for its diffusion. His letters, which are numerous and most interesting, are full of evidences of the universality of his vigilance. On the occasion of the threatened invasion of Rome by the Lombards he showed himself in act and in influence, if not he showed himself in act and in influence, if not as yet in avowed authority, a temporal sovereign. Against the memory of his administration of Rome a charge was formerly made, that in his zeal against paganism he destroyed the ancient temples and other buildings of the pagan eity. But Gibbon confesses that the evidence is 'recent and uncertain;' and, indeed, the only anthority to which Gibbon himself refers, Platina, simply mentions the charge in order to repudiate it. Though Gregory had a contempt for mere letters, and thought the oracles of God were above the and thought the oracles of God were above the rules of grammar, it is not true that he burned the Palatine Library in his hatred of pagan literature. As regards the general government of the church, Gregory reprobated very strongly the assumption by John, patriarch of Constantinople, of the title of Ecumenical or Universal Bishop, the more especially as the object of John in assuming this title was to justify an exercise of jurisdiction outside of the limits of his own patriarchate. In his writings, too, the details of the whole dogmatical system of the modern church are very fully developed. His *Letters*, and, still more, his *Dialogues* abound with miraculous and legendary narratives, which, however uncritical in their character, are most interesting as illustrating the manners and habits of thought of that age. With all his zeal for the diffusion of Christianity, Gregory was most gentle in his treatment of heathens and Jews, and he used all his efforts to repress slave-dealing and to mitigate the severity of slavery. He died March 12, 604. Besides his Moradia he left homilies on Ezekiel and on the Gospels, the Regula (or Cura Pastoralis), and the Surrementarium and Antiphonarium. In exegesis he is a fearless allegorist. The best editions of his works are the Benedictine (4 vols. folio, 1705) and that in Migne's *Patrologia* (vols. lxxv.-lxxix.).

See the studies by Lau (1845) and Pfahler (1852); Rev. J. Barmby's little book in the 'Fathers for English Readers' (1879); F. W. Kellett, Gregory the Great (1889); and the full bibliography to Zöpffel's article in vol. v. (1879) of Harzog-Plitt's Reut-Encyklopidie.

GREGORY H., by birth a Roman, was elected pope in 715. His pontificate is specially noticeable as forming an epech in the progress of the territorial pre-eminence of the Roman see in Italy. The eastern emperors having almost entirely abandoned the government and, still more, the defence of Italy, and the aggressions of the Lombards becoming every year more formidable, the imperial authority in the West sank into little more than a name; and the tyrannical and barbarons measures by which the Emperor Leo the Isanrian attempted to enforce his decrees against image-worship weakened still more the tic which bound Italy to the eastern emperors. The natural result of the diminution of the imperial authority in Italy was the growth of that of the pope, to whom the deserted Italian provinces looked, partly as their spiritnal connsellor and head, partly as their mediator with the barbarons enemy, partly as their mediator with the barbarons enemy, partly as the centre of the political federation for self-defence which their very isolation necessitated. Gregory convened a conneil in Rome on the subject of the honour due to images, and addressed a very energetic letter to the emperor, protesting against the sacrilegious outrages of which he had been guilty, explaining and defending the Catholic doctrine on image-worship, and warning the emperor that the feelings of his subjects were so completely alienated by his conduct that it was only the pupe's influence which prevented them from throwing off all allegiance. Gregory has been accused of himself fomenting this disaffection. The contrary, however, is attested, not only by his own letters, but also by Paul the Deacon, in his History of the Lombards (book vichap. 39); and it is quite certain that the circunstances themselves, and the well-known character of the emperor, would sufficiently explain any degree of discontent in Italy. At all events, the result of the contest was a most notable aggrandisement of the political authority and influence of the popes in Italy. Gregory II. was distinguished by his zeal for the evangelisation of heathen lands; it was under his auspices that the famous Winfried or Boniface entered on his missionary work in Germany. He died in 731.

Gregory II., a native of Syria, succeeded Gregory II. in 731. In the same year he hurled the anathema of excommunication against the Ieonoclasts, and the retaliations of Lee the Isantian did much to weaken the ancient tie between the papedom and the empire. The encreachments of the Lembards in Italy during his pontificate became so formidable that, as the eastern emperors still remained powerless or indifferent to the protection of the Italian provinces, the Romans charged Gregory to send a deputation to Charles Martel, soliciting his succour against the enoury, and proposing upon that condition to recognise him as their protector, and to confer on him the title of consul and patrician of Rome. This offer was made by the pope 'in virtue of a decree of the Roman primus,' and is of great historical importance in the consideration of the nature and origin of the papal power in Italy. The embassy failed, owing to the pressure of his war with the Saracens, to enlist the aid of Charles; but it was a step towards the consummation of the independence of the West.

GREGORY VII., pre-eminently the historical representative of the temporal claims of the medieval papacy, was horn, about 1020, at Soana, a village in the southern border of Thecauy. Whether his family belonged to the burgher or the noble class is disputed by his biographers. His family name, Hildebrand, would imply a Tentonic descent; but by birth and education at least he was Italian. His youth was passed at Rome, in the monastery of St Maria, on the Aventine, of which his nucle, Lanrentius (afterwards Bishop of Amalfi), was abbot. From Rome he passed into France, where he entered the celebrated monastery at Clugny, in the schools of which he completed his education; and from the strict ascetic observances there practised by him

he acquired those habits of ansterity which distinguished his whole life. He visited the court of Henry III., and obtained by his preaching the reputation of great cloquence. On his return to Rome he became the chaplain of Gregory VI., but after the death of that pontiff he again withdrew to his former retreat at Clugny, from which he was only recalled by the carnest appeal of the new and zealous pope, Lea IX., whom he accompanied to Rome in 1049. Under this active and devoted pontiff Hildebrand exercised great influence. He now for the first time received hely orders, and was eventually created cardinal. Besides the responsible domestic employments which were assigned to him, he was sent as legate to the important Conneil of Tours, in which the cause of Berengarius was examined. Under all the short but important pontificates of the successors of Leo IX., who are known in history as the Genman popes—Victor II., Stephen IX., Benedict X., and Alexander II.—Hildebrand continued to exercise the same influence, and by inspiring into their government of the church the great principles to which his life was dovoted he prepared the way for the full development of his theory of the nanaer.

the full development of his theory of the papacy.

He was unanimously elected at Rome, without awaiting the imperial authorisation, three days after the death of Alexander II. The German history, who feared the effect of those reforms of which his name was a guarantee, endeavoured to prevent the Emperor Henry IV. endeavoured to prevent the Emperor Henry IV. from assenting to the election; but Henry gave his approval, and the new pope was crowned, July 10, 1073. From the date of his election the pontificate of Gregory was one life-long struggle for the assertion of the principles with which he believed the welfare of the church and the regeneration of society itself to be inseparably bound up. Regarding as the great evil of his time the thoroughly secularised condition of the church in a great part of Europe, and especially in Germany and northern of Europe, and especially in Germany and northern Italy, he directed against this all his efforts. The position occupied by the higher clergy as feudal proprietors, the right claimed by the erown of investiture with the temporalities of benefices, investiture with the temporalities of benefices, the consequent dependence of the elergy upon the sovereign, and the temptation to simony which it involved were, in the mind of Gregory, the cause of all the evils under which Enrope was groaning; and of all these he regarded Investiture (q.v.) as the fountain and the source. While, therefore, he laboured by every species of enactment, by visitations, by encyclical letters, and by personal exhortations, precepts, and eensnes, to enforce the observance of all the details of discipline—eclibacy, the residence of the clergy, the instruction of the people—and to repress sinony and phralism, it was against the fundamental abuse of investiture that his main efforts were directed. In the year after his election he prodirected. In the year after his election he pro-hibited this practice, under pain of excommuni-cation both for the investor and the invested, and in the following year he actually issued that sentence against several bishops and councillors of the empire. The Emperor Henry IV. disregarding these menaces and taking the offending hishops under his protection, Gregory cited him to Rome to answer for his conduct. Henry's sole reply was a haughty deliance; and in a diet at Worms in 1078 he formally declared Gregory at Worms in 1076 he formally declared Gegory deposed from the pontificate. The pontiff was not slow to retaliate by a sentence of excommunieation; and in this sentence, nuless revoked or removed by absolution in twelve months, by the law of the empire at the time, was involved the forfeithre of all civil rights, and deposition from every civil and political office. Henry's Saxon subjects appealing to this law against him, he

was compelled to yield, and by a humiliating penance, to which he submitted at Canossa (q.v.) in January 1077, he obtained absolution from the pope in person. This submission, however, was but feigned; and on his subsequent triumph over his rival, Rudolf of Swabia, Henry resumed hostilities with the pope, and in 1080 again declared him deposed, and caused to be appointed in his place the antipope Guibert, Archbishop of Ravenna, under the name of Clement III. After a protracted siege of three years, Henry, in the year 1084, took possession of Rome. Gregory shut himself up in the castle of St Angelo. Just, however, as he was on the point of falling into his enemy's hands, Robert Guiscard, the Norman Duke of Apnlia, entered the city, set Gregory free, and compelled Henry to return to Germany; but the wretched condition to which Rome was reduced obliged Gregory to withdraw first to Monte Cassino and ultimately to Salerno, where he died, May 25, 1085. His dying words are a deeply affecting but stern and unbending profession of the faith of his whole life, and of the profound convictions under which even his enemies acknowledge him to have acted—'I have loved justice and hated iniquity; therefore I die an exile.'

The character of Gregory VII. and the theory of church-polity which he represents are differently judged by the different religious schools; but his theory is confe-sed by all, even those who most strongly reproducte it as an excess, to have been grand in its conception and unselfish in its object. 'The theory of Augustine's city of God,' says Milman, 'no doubt swam before his mind, on which a new Rome was to rise and rule the world like the life of the profession of the good of the profession of the good of the profession of the good o

on which a new Rome was to rise and rule the world by religion. In his conception of the constitution of Christian society the spiritual power was the first and highest element. It was to direct, to command the temporal, and, in a certain sense, to compel its obcdience; but, as the theory is explained by Fenelon, by Gosselin, and other modern Catholics, the arms which it was authorised to use for the purpose of coercion were the arms of the spirit only. It could compel by penalties, but these penalties were only the censures of the church; and if in certain circumstances temporal forfeitures (as in the case of Henry IV.) were annexed to these censures, this, it is argued, was the result of the civil legislation of the particular country, not of any general ecclesiastical law. Thus, in the case of Henry, the imperial crown was forfeited, according to the Swabian code, by the mere fact of the emperor's remaining for twelve mouths under excommunication without obtaining absolution from the sentence. over, whatever may be said of the power in itself, or of the lengths to which it has at times extended, the occasion and the object of its exercise in the hands of Gregory were always such as to command the sympathy of the philosophical student of the history of the middle ages. By his firm and un-bending efforts to suppress the unchristian vices which deformed society, and to restrain the tyranny which oppressed the subject as much as it en-slaved the church, he taught his age 'that there was a being on earth whose special duty it was to defend the defenceless, to succour the succourless, to afford a refuge to the widow and orphan, and to be the guardian of the poor.' Dean Milman to be the guardian of the poor.' Dean Milman sums up his history of Gregory VII. as of one who is to be contemplated not merely with awe, but in some respects, and with some great drawbacks, as a benefactor of mankind.

See Milman's Latin Christianity (vol. iii.); Giesebecht, Geschichte der Deutsch. Kaiserzeit (vol. iii.); Bowden, Life of Gregory VII. (1840); Volgt, Hildebrand als Papst (2d ed. 1846); Gfrörer, Papst Gregor VII. (7 vols. 1859-61); W. R. W. Stephens, Hildebrand

and his Times (1888); and the studies by Soltl (1847), Villemain (1872; Eng. trans. 1873), Langeron (1874), and Meltzer (1876). His whole literary remains are included within seven books or Registers of letters, which have been often printed.

Gregory XIII., Ugo Buoncompagno, was born at Bologna, January 7, 1502. He was educated in his native city, where he filled the chair of Law for several years. Having settled at Rome in 1539, he was distinguished by several important employments, and was one of the theologians of the Council of Trent; on his return thence he was created cardinal in 1565, and sent as legate to Spain. On the death of Pius V. Gregory was elected pope in 1572. Not one among the post-Reformation pontiffs has surpassed Gregory XIII. in zeal for the promotion and improvement of education; a large proportion of the colleges in Rome were wholly or in part endowed by him; and his expenditure for educational purposes is said to have exceeded 2,000,000 Roman crowns. The most interesting event of his pontificate, in a scientific point of view, is the correction of the Calendar (q.v.), which was the result of long consideration, and was finally made public in 1582. A grievous imputation rests on the memory of Gregory from the fact of his having ordered a Te Deum in Rome on occasion of the infamous massacre of St Bartholomew; but in justice it must be said that this was done on the report of the French ambassador, which represented that bloody event not as a deliherate aggression on the part of the Catholics, but simply as the suppression of a baffled Huguenot conspiracy. Gregory published a valuable edition of the Decretum Gratiani with learned notes. He died in 1585, in the eighty-third year of his age.

Gregory, St, surnamed Illuminator (Armenian Lusavoritch, Gr. Phūtistēs), was of the royal Parthian race of the Arsacidæ, and son of Anak, murderer of Chosrov I., king of Armenia. For this crime his whole fumily was slain save himself. He owed his escape to a Christian nurse, who secretly conveyed him, when he was two years old, to Cæsarea, in Cappadocia, her native town. He there married a Christian, who bore him two sons, and soon afterwards became a nun. Gregory proceeded to Rome, and entered the service of Terdat, Chosrov's son. After Terdat (Tiridates III.) had, with the help of the Romans, recovered his father's kingdom (286), Gregory, for his refusal to crown with garlands the statue of Anahit, tutelary goddess of Armenia, was thrown by Terdat into a deep pit, where a pious widow nourished him for fourteen years. About the end of that time Terdat was visited with the punishment of Nebuchadnezzar. Healed and baptised by Gregory, he became a zealons Christian, and established Christianity by force throughout his dominions. Gregory was consecrated bishop and head of the Armenian Church by Leontius, Archbishop of Cæsarea, and erected a great number of cluuches, monasteries, hospitals, and schools in which the sons of heathen priests were trained for the Christian priesthood, whereby a strongly national stamp was given to the church in Armenia. Having resigned the patriarchate in favour of his second son Aristaces, Gregory in 331 retired to a cave at the foot of Mount Sebuh in Upper Armenia, where he died in a few years. The patriarchate was held for many years by his descendants.

The sources for the history of Gregory, which is partly legendary, are two early Armenian histories written by Agathangelos and by Simeon Metaphrastes. A French translation of the former by Victor Langlois appears in vol. i. of the Historiens de l'Arménie (1867); the latter (evidently drawn from the former) is given in vol. cxv. of Migne's Patrol. Greec. The former was known to

Moses of Khorene, the Herodotus of Armenia, who flourished in the 5th century. The best edition of his work was printed at Venice in 1865: a Latin translation by the brothers Whisten appeared at London in 1736; a French by Levaillant de Florival at Paris in 1841. See S. C. Malan's Eng. translation (1868) of the life of Gregory, from the Armenian work of the Vartabed Matthew (published at Venice, 1749).

Gregory Nazianzen was, by his own account, born about 330, at Arianzus, a village near Nazianzus, in Cappadocia, not far from Cresarea. father, whose name also was Gregory, and who had originally belonged to the heathen sect of Hypsistarians, worshippers of the Most High, but also of the fire, like the Persians, and keepers of the Jewish Sabbath and the law of the purity of meats, had, chiefly through the influence of his pious wife Nonna, become a convert to Christianity about the time of the great Nicene Council (325), and four years later was raised to the dignity of Bishop of Anzianzus. Formed to picty by domestic example, Gregory was at an early age sent to Caesarea in Palestine, where the study of eloquence then flourished. He next attended the schools of Alexandrian and Alexa andria, and subsequently (about 348 to 358) of Alexandria, and subsequently (about 348 to 358) of Atlens, where he met Basil the Great, then also a young student, and became his most intimate friend. At the same time there studied at Atlens Julian, later emperor and apostate, and there is no doubt that the three often met and had friendly discussion of the subset of this general transfer. discussions on the subjects of their common studies; although (fregory, even at that time, augured no good for Julian, who exhibited signs of 'an unsettled and arrogant mind.' Gregory, having made brilliant progress in eloquence, philosophy, and sacred literature, returned to Nazianzus, and and sacred literature, returned to Nazianzus, and in 360 received baptism at the hands of his own father, consecrating to God, at the same time, all his goods, his glory, his health, his tongue, and his talents; and, in order to be still more able to pursue a life of anstere devotion, he took up his abode with Basil in the desert near the river Iris, in Pontus. Recalled by his father, Gregory was ordained priest, but afterwards fled. Being recalled a second time, he returned to Nazianzus, assisted his father in the ministry, and preached to the people. In 371 or 372 St Basil, who in the meantime had become Bishop of Casarea, prevailed upon him to accept the see of Sasima, a small town in Cappadocia. But he had scarcely taken possession of his new dignity, when, overcome again by his innate renew dignity, when, overcome again by his innate repugnance to public life, he retired, a bishop without a hishopric, to Nazianzus, where he stayed until the death of his father in 374. He then went into a monastery at Selencia, which, however, after the death of the Emperor Valeus (378), he was induced to leave, in order to undertake the charge of a small Nicene congregation in Constantinople, where until then Arianism had held undisputed sway. Gregory was after a short time, when his erudition and eloquence became conspicuous, elected arch-bishop, upon which the Arians became so exasporated that his very life was in danger. Gregory, although upheld by Pope Damasns and the Emperor Theodosius, preferred resigning his see voluntarily, 'in order to lay the storm, like another Jonah, although he had not excited it.' He went back to Nazianzus, and took up his solitary abode near Arianzas, where, after some years of a most ascetic life, he died in 389. His ashes were convoyed to Constantinople, and thence, during the Crusades, to Rome. His day is, with the Latins, the 9th of May. His character and temper, ardent and enthusiastic, but at the same time dreamy and melancholy, hard, but also tender, ambitious and yet humble, and all his instability and vacillation botween a life of contemplation and of action, are vividly depicted in his writings. These mostly

serve the great aim of his life-to uphold the integrity of Nicene orthodoxy against the heresies of the Arians and Apollinarists. The merits of this writings are very unequal, sometimes rising to sublime flights of poetical genus, and displaying classical elegance and refinement, at other times redundant, pedantic, and heavy with far-fetched similes. Yet Gregory may fairly be pronounced similes. Yet Gregory may fairly be pronounced one of the first orators and most accomplished and thoughtful writers of all times. His surviying works consist chiefly of about 45 sermons, 243 letters, and 407 poems (dogmatic and moral poems, prayers and hymns, autobiographic and historical poems, epitaphs, and epigrams). The poems were separately printed in a beautiful Aldine edition at Venice in 1504. The first edition of his complete works appeared at Basel in 1550, folio. All the carlier editions were set aside by the great All the carrier editions were set aside by the great and long-delayed edition that appeared under the anspices of the Benedictines, in 2 vals. (Paris, 1778-1842). The first volume was finally edited by Clemencet; the second by Caillon. His separate works have frequently been edited, and partly translated into different tongues.

See monographs by Ullmann (1825; Eng. trans. 1851; 2d ed. Gotha, 1867) and by A. Beneit (Paris, 1876); and Montant's Revue critique (1878).

Gregory of Nyssa, the younger brother of Basil the Great. After being educated by Basil, he showed an inclination to become a teacher of eloquence, but by the influence of Gregory Nazianzen was prevailed apon to devote himself to the church. Though married, he was in 371 or 372 consecrated by Basil bishop of the little town of Nyssa, in Cappadocia. During the persecution of the adherents of the Nicene Creed in the reign of Valens, Gregory was, at the instigation of the governor of Pontas, deposed by a synod held in Galatia, on the pretext that he had wasted the church's goods. He made his escape, and after the death of Valens was joyfully welcomed back by his flock (378). He was present at the Council of Constantinople in 381, and (along with two other hishops) was appointed to the general oversight of the diocese of Pontus hoth by the conneil and by a decree of his friend Theodosius, by whom he had been called 'the common pillar of the church.' He travelled to Arabia and Jerusalem to set in order the churches there, and was again at a synod in Constantinople in 394. He must have died soon afterwards. Of the three Cappadocians Gregory was the greatest speculative theologian, the most faithful to Origenistic views, and not the least zealous defender of Nicene doctrine. He was a less able ruler than Basil, who sometimes lamented his untimely 'good nature' and 'simplicity.' His chief dogmatic work is his Twelve Books against Euromius (the so-called 13th book is an independent work). Among his other works are treatises on the doctrine of the Trinity, including Antirrhetieus (against Apollinaris) and an appeal To the Circels, from 'common notions' (axions), an attempt to establish the doctrine on grounds of abstract reason; a treatise On Destiny (against pagan fatalism); On the Soul and Resurrection (ed. Krabinger, Leip. 1837), in the form of a dialogne with his sister Makrina on her deathbed; several ascetic treatises, many sermons, and 23 opistles. In his great ('taterhetical Discourse (ed. Krabinger, Munich, 1838), which was written to convince educated heathers and Jews, he arrues convince educated heathens and Jews, he argues that the incarnation is the best possible form of redemption, as manifesting the four chief attributes of God-his onnipotence, mercy, wisdom, and justice. God alone is, and all turning away from God to the things of sense (things without being) is death. Christ did not assume a single human nature, but human mature itself in its entirety. 'His return from death is for the mortal race the

beginning of their return to eternal life.' His incarnation is of cosmical significance, and extends to the whole spiritual creation, bringing the whole nniverse into harmony. 'Not only among men is he born man, but (with absolute consistency) coming also into being among angels he brings himself down to their nature' (Discourse on the Assension of Christ). 'By this,' says Harnack, 'the incarnation is resolved into a necessary cosmical process; it becomes a special case of the omnipresence of the Deity in his creation. Alienation from God is as much included in the plan of the Kosmos as is restitution to him. Gregory helped to hand on to later times the pantheistic thought which he never himself conceived clearly and apart from the historical. There is a real kinship between him and the pantheistic Monophysites, the Arcopagite, Scotus Erigena, and even the modern 'theral'' theologians of Hegelian dyc.'

His works were edited by Fronton du Dnc (Paris, 1615; reprinted 1638), and more completely in Migne's Patrologia (series Greea, vols. xliv.-xlvi.). A beginning was made towards a good critical edition by G. H. Forbes (Burntisland, 1855) and Fr. Ochler (Halle, 1865). The latter has published a selection with a German translation (4 vols. Leip. 1858-59). See J. Rupp's monograph on Gregory (1834); H. Weiss, Die drei grossen Cappadocier (1872); and Harnack, Dogmengeschichte, vol. ii. (1888).

Gregory of Tours, the 'father of Frankish story,' was horn about 540 at Arverna (now Clerhistory, was horn about 540 at Arverna (now Clermont), the chief town of Auvergne, and belonged to one of the most distinguished Roman families of Gaul. Originally called Georgius Florentins, he assumed the name Gregory out of respect for his mother's grandfather, Gregory, Bishop of Langres.
He was educated by his nucle, Gallus, Bishop of Clermont, and after his death by Avitus, a priest of his native town. His recovery from a severe sickmess, through a pilgrimage to the grave of St Martin of Tours, led Gregory to devote himself to the service of the church, and by the choice of the clergy and people and favour of Sighert, king of Austrasia, to whom Auvergne had fallen on the death of Clothar I. in 561, he became Bishop of Toms in 573. He gave himself zealously to his sacred office and the public good. In the struggles between Sigbert and his wife Brunhilda on the one side against Chilperic and his wife Fredegond on the other he took the side of the former, and in the other he took the sale of the former, and in the vicissitudes of a conflict in which Tours frequently changed masters had to suffer many persecutions. After the death of Chilperic, whom Gregory calls 'the Nero and Herod of our time,' he enjoyed great influence over his successors, Guntram and Childebert II. He died 17th November 594. The fame of Gregory rests on his Historiae sive Annalium fame of Gregory resus on his resource started and Francorium libri x., the chief authority for the history of Gaul in the 6th century. It begins with a summary of universal history, but by the end of book i. reaches the Frankish conquest and the death of St Martin. From this point onwards the narrative is written with much greater fullness, the last seven years (585-91) extending to four books. Gregory himself laments his unskilfulness in writing -his wrong genders and cases, and misused pre-positions. His ten books are the artless memoranda of a contemporary, bearing on their face the clear stamp of truth. It is entirely to him that we owe our exact knowledge of the dark and stormy times of the Merovingian kings.

Besides his History, he wrote Miraculorum libri vii., a hagiographical compilation, including four books on the innumerable miracles of St Martin. A critical edition of his works was published by Rumart in 1699 (1 vol. folio), and in Migne's collection (vol. lxxi.). Of the History the best editions are by Guadet and Turanne (1836-38), and that in the Monumenta Germaniae Historica (1884-85). French translations are by H. L. Bordier (2 vols. 1859-61) and that edited by Jacobs (2 vols. 1861); there is

a German translation by W. Giesebrecht (1851; 9th ed. 1873). The historical material supplied by Gregory is reproduced in Thierry's Recit des Temps Meroringiens (Paris, 1840). A French translation of the Books of Miracles and lesser writing, was published by H. L. Bordier (4 vols. 1857-64). See Libell, Gregor von Tours und seine Zeit (1839; 2d cd. 1899); G. Monod, Etnels critiques sur les sources de l'Histoire Meroringienne (Paris, 1872); and vol. i. of Mark Pattison's Essays (1889).

Thaumaturgus Gregory ('wonderworker'), a celebrated disciple of Origen, and the apostle of the Christian church in Pontus. He was born about 210, of wealthy heathen parents at Neocasarea, in Pontus, and was originally named Theodorus. His early education was for the practice of law, but, coming under the influence of Origen at Casarea in Palestine, he was his disciple for about eight years, with an interruption caused by the persecution under Maximin the Thracian, doring which he probably studied at Alexandria. Origen, in a letter to him, expressed the wish that he would 'spoil the Egyptians' by placing the intellectual treasures he gathered from the Greeks in the holy service of Christian philosophy. After this he produced his Panegyricus on Origen, and, returning to his native country, was consecrated Bishop of Neocresarea by Phaedimus, Bishop of Amasea. The influence of Gregory in Asia Minor continued from the middle of the 3d century to far down into the 4th, and its extent may be inferred from the numerous legends of his miracles, and the tradition that at his death (alont 270) there were only as many pagans in Neoeusarea as there had been Christians in it at his consecration—viz. seventeen. His celebrated Ethtesis, or Confession of Faith, said to have been derived by revelation from the Virgin Mary and the apostle John, is a summary of the theology of Origen, and was used as the basis of the instruction given to catechumens at Neocasaica. It is of the greatest value as a record of the state of the theology at the middle of the 3d century. 'There is scarcely a sentence in it,' says Harnack, 'that recalls to us the Bible; it is a com-Harnack, 'that recalls to us the Bible; it is a compendium of the sublimest speculation, only in the words "Father," "Son," and "Spirit" reminding us of the gospel.' Its genuiueness is disputed, but is ably defended by Caspari. Gregory is said to have contended against Sabellianism, yet in his lost Argument with Ælian Basil tells us there stood this sentence: 'the Father and the Son are two in idea, but one in essence.' But as Basil also testifies that he spoke of the Son as a 'creature' and a 'work,' the above sentence is probably no more than an Origenistic assertion of the substantial unity of the Deity in opnosition to tritheistic tial unity of the Deity in opposition to tritheistic views. The gennineness of two other treatise-attributed to him, one addressed to Philagrins, on the co-essentiality of the persons in the Godhead, and the other, a dialogne with Theoponpus, on the question whether the Deity is capable or incapable of suffering, is undecided. Gregory's works are printed in vol. iii. of Galland's Bibliotheca Patrum, and in Migne's collection, vol. x. His Punctum. gyrizus (which contains an autobiography of its writer) is printed among the works of Origen. A special edition was published by J. A. Bengel in

See Ryssel, Gregorius Thaumaturqus: sein Leben und seine Schriften (Leip. 1880); and Harnack, Dogmengeschichte, vol. i. (Freiburg im Breisgan, 1888).

Gregory, the name of a Scottish family distinguished, like that of the Bernouillis, in the history of science.—James Gregory was born at Aberdeen in November 1638, and studied at Marischal College there. Before completing his twenty-fourth year he invented the reflecting telescope known by his name, and described it in a work entitled Optica Promota. In 1665 he

went to the university of Padua, where in 1667 he produced Vera Circuli et Hyperbolæ Quadratura, followed in 1668 by Geometriæ Pars Universalis and Exercitationes Geometriæ. Shortly after his return home he obtained (1669) the pro after his return hance he obtained (1669) the professorship of Mathematics at St Andrews, a chair which he filled until his removal to a similar one at Edinburgh in 1674. He died in that city in the following year. To him is also attributed a satirical tract, Great and New Art of weighing Vanity (1672). For an account of his works and discoveries, see Hutton's Philosophical and Mathematical Dictionary.—DAVID GREGORY, nephew of the above, was born at Aberdeen in 1661, and there received the early part of his education, which was received the early part of his education, which was completed at Edinburgh. In his twenty-third year he was appointed professor of Mathematics in the nniversity of the latter city. In 1691, through the friendship of Newton and Flamsteed, he obtained the Savilian professorship of Astronomy at Oxford. He died at Maidenhead in 1708. Among his works may be mentioned Exercitatio Geometrica de Dimonsione Figurarum (1684); Catoptrica et Dioptrica Spharica Elementa (1695); Astronomia Physica et Geometrica Elementa (1702), an illustration and defence of Newton's system; and an tration and defence of Newton's system; and an edition of Enclid in Greek and Latin (1703). He also wrote a treatise on Practical Geometry (1745) and many memoirs in the Phil. Trans., vols. xviii.—xxv.—John Gregory, grandson of James, was born at Aberdeen, 3d June 1724, where he received his early education; afterwards he studied medicine at Edinburgh and Leyden. After filling the chair of Medicine at Aberdeen from 1755 ha cine at Edinburgh and Leyden. After filling the chair of Medicine at Aberdeen from 1755, he was appointed in 1766 professor of the Practice of Medicine in Edinburgh, where he died, 9th February 1778. Among his works are Elements of the Practice of Physic (1772) and A Comparatine View of the State and Faculties of Man with those of the Animal World (1765). In 1788 his works were collected in four vols. by Tytler (Lord Woodhouselee), who prefaced them by a life of the anthor.—His san, JAMES (REEGORY, horn at Aberdeen in 1753, became in 1776 professor of the Practice of Medicine at Edinburgh, and eventually a leading man in his profession. He died 2d a leading man in his profession. He died 2d April 1821. He was the anthor of Conspectus April 1821, 116 was the anthor of Conspectus Medicine Theoretica and of two vals, of Philosophical and Literary Essays (1792).—This James's son, William Greenber, born 25th December 1803, professor of Chemistry at Glasgow (1837), in King's College, Aberdeen (1839), and at Edinburgh University (1844), is noticeable for his advocacy of Tablick views in Great Britain. He died cacy of Liebig's views in Great Britain. He died 24th April 1858. He wrote *Outlines of Chemistry* (1845), and translated (1855) Liebig's *Principles of Agricultural Chemistry*.—The stomachic and aperient known as Gregory's mixture was compounded by Dr James Gregory, and consists of whether the property of the principles. rhubarb, magnesia, and ginger.

Gregory, OLINTHUS, mathematician and miscellaneous writer, was born at Yaxley, Huntingdon, 29th January 1774, and became a newspaper editor and then a teacher of mathematics successively at Cambridge and Woolwich. At Woolwich he died 2d February 1841. He wrote several works on mathematics, superintended almanaes, edited gentlemen's diaries, and published lives of Robert Hall and Mason Good.

Greifenberg, a town of Prussia, in the province of Pomerania, dating from 1262, is situated 55 miles by rail NE. of Stettin. Pop. 5636.

Greifenhagen, an agricultural town of Prussia, on the Oder, 13 miles by rail SSW. of Stettin. Pop. 6603.

Greifswald, a town of Prussia, in the province of Pomerania, is situated 2½ miles from the mouth

of the Ryck and 25 miles by rail SE, of Stralsund. The university (founded in 1456) was attended by 1041 students in 1888, of whom nearly one-half studied medicine. The university is well equipped with medical museums, laboratories, &c.; the library contains about 135,000 volumes. There is a considerable shipping trade. The chief industries include the making of machinery, chains, and railway wagons, the curing of herrings, and ironfounding. Pop. (1875) 18,016; (1885) 20,333. Shortly after being made a town (1250) Greifswald joined the Hauscatic Leagne. At the peace of Westphalia (1648) it came into the possession of Sweden; but, together with the whole of Swedish Pomerania, was coled to Prussia in 1815. See Pyl's Geschichte Greifswalds (1879).

Greisen, a lock composed essentially of quartz and mich, but which almost invariably contains topax. It is met with in regions where tin eres abound, and is believed to be a granite which has been metamorphosed in connection with exhalations of fluoric acid.

Greiz, capital of the German principality of Renss-Greiz, and seat of the sovereign prince, is situated on the White Elster, 47 miles SSW, of Leipzig. It contains three castles and a 13th-century church, and manufactures cotton and woollen goods, also eashmere and shawls, and possesses dyeworks and linen-printing establishments. Pop. (1875) 12,657; (1885) 17,288. The town was severely ravaged by fire in 1494, and again in 1802.

Grenada, an island of volcanic origin in the British West Indies, lying N. by W. from Trinidad, mountainons and picturesque, with an area of 133 sq. m. Some of the craters in the central ridge of mountains, rising to 3000 feet, have been transformed into large lakes. Streams and mineral springs abound. There are several good natural harbours, that of St George (pop. 4000), the capital of the island and the hendquarters of the government of the Windward Islands, being accounted one of the best in the West Indies, though it is not now much used. The inhabitants, 42,403 in 1881, and 48,346 in 1887, who are almost all negroes, cultivate cocoa, coffee, and oranges. Further, a little rum is mannfactured, and spices and fruits are grown. Exports in 1887, £217,949; imports, £143,185. Grenada has been a crown-colony since 1885; previous to that date it had a constitutional government. Columbus was the discoverer of the island in 1498. In the words of Mr Fronde, Grenada was 'the home for centuries of man-eating Caribs, French for a century and a half, and finally, after many desperate struggles fer it, was ceded to England at the treaty of Versailles' (1783).

Grenade, a small shell exploded by a time-fuse, about 3 inches in diameter, of iron or annealed glass, filled with powder, and thrown from the hand. They are chiefly used against the dense masses of troops assembled in the ditch of a fortress during an assault, and then are often rolled over the parapet through wooden troughs instead of being thrown by hand.

Grenadier, originally a soldier who was employed in throwing hand-grenades, and then a member of the first company of every battalion of foot, in which the tallest and finest men were placed. This company used to be distinguished by iall bearskin caps, and held the place of honouvix the right when in line, and the front when in column. In the British army the name is now only used as the title of the first three battalions of the foot-grards.

Grenadines, a chain of islets in the West Indies, extending between Grenada, on which they are chiefly dependent, and St Vincent, with a total area of 13 sq. m., and about 7300 inhabitants. The largest is Carriacon, with nearly 11 sq. m.; pop. (1881) 5154.

Grenelle, a south-western suburb of Paris.

Grenoble (Lat. Gratianopolis), since 1839 a first-class fortified city of France, capital of the department of Isère, is finely situated in a beautiful valley 59 miles SE. of Lyons. It is divided by the Isère into two unequal portions, connected by three bridge. The löth-century cathedral of Notre Dame, St Laurent, St André (with Bayard's monument, transferred hither in 1822), and the Gothic pulatis de-justice are the most interesting building. The town has a university of three faculties, with about 275 students, and numerous other educational establishments, including an industrial school and a school of forestry. The library contains 170,000 volumes and 7500 MSS. The staple industry is the manufacture of kid gloves (employing 22,000 persons in 115 factories). Besides this, there are manufactures of liquents (Chartreuse), hats, cement, and hardware, and an active trade in hemp, corn, timber, wine, and cheese. Pop. (1872) 35,280; (1886) 49,338. Grenoble, originally a city of the Allohroges, was fortified by the Romans. It was Burgundian in the 5th century, and in the 11th belonged to the empire. Later on it became the capital of empire. Later on it became the capital of Dauphine, along with which it passed to France in 1349. The town has been frequently mundated, the flood of 1778 being the most memorable. Pitot's Histoire de Grénoble (2 vols. 1843-46).

Grenville, George, the Euglish statesman who passed the Stamp Act which first drove the American colonics to resistance, was born on 14th Afferean colonies to resistance, was born on 14th October 1712. He was younger brother to Richard Grenville, Earl Temple (q.v.), and brother-in-law of the Earl of Chatham. He entered parliament in 1741, and from 1744 to 1762 filled several government offices. In 1757 he introduced a bill for the regulation of the payment of the navy. In 1762 he became Secretary of State, and then First Lord of the Admiralty, and in the following year he of the Admiralty; and in the following year he succeeded Lord Bute as prime-minister, uniting in himself the offices of Chancellor of the Exchequer and First Lord of the Treasury. The most promiand First Lord of the Treasury. neut facts of his administration were the prosecu-Stamp Act. He resigned the premiership in 1765, and died 13th November 1770. Although an honest and honourable man, his overleaping ambition, want of tact, and imperious nature made him a highly unpopular minister. See the Grenville Papers, edited by W. J. Smith (4 vols. 1852-53).

Grenville, SIR RICHARD, one of England's un-forgotten worthies, sprang from an ancient Cornish family, and early distinguished himself under Elizabeth by his courage both on land and sea. He was knighted about 1577, and in 1585 commanded the seven ships which carried out Raleigh's first colony to Virginia, the ill-success of which, according to Ralph Lane, its leader, was mainly due to the commander's tyranny. Linschoten speaks of the fierceness of his temper, and how at table he would crush the glasses between his teeth till the blood ran out of his mouth. Grenville fought and spoiled the Spaniards like other heroes of his time, and while preparing another fleet for Virginia was stayed by the queen at Bideford to take his share in the glory of the Armada fight. In August 1591 he commanded the Revenge in Lord Thomas Howard's squadron of six vessels, when they fell in with a Spanish fleet of fifty-three sail off Flores, in the Azores. Grenville took off his ninety sick men from the island, and, while the admiral made good his escape, refused with splendid disobedi-

ence 'to turn from the enemy, alleging that he would tather choose to die than to dishonour himself, his country, and her majesty's ship. The great San Philip, of 1500 tons, towering in height above the Revenge, soon took the wind from her, and now she found herself in the midst of a ring of manying and lottelled the the same of the same o enemies, and a battle almost unequalled in the history of the world began. From three in the afternoon, and all through the night till morning the battle raged, the stars above blotted out by the sulphnious canopy of smoke, while as many as fifteen several Spanish ships were beaten off in turns, and no less than 800 shot of great artillery Two ships were sunk by her side, two endured. more so disabled that they soon foundered, while as many as 2000 men were slain or drowned. the Revenge was by this time a helpless wicck, all her powder spent, the pikes broken, forty of her 100 sound men slain, and the most part of the rest hurt, the vice-admiral himself sore wounded, both in the body and in the head. Sir Richard would have had the master-gamner to blow up the ship, but was overborne by his surviving men, and carried on board one of the Spanish ships, where he died of his wounds the second or third day after, with the words on his lips, according to Linschoten's account: 'Here die I, Richard Grenville, with a joyful and quiet mind: for that I have ended my life as a true soldier ought to do, that hath fought for his country, queen, jeligion, and honour. Whereby my soul most joyfully departeth out of this body, and shall always leave behind it an everlasting fame of a valiant and true soldier, that hath done his duty as he was bound to do.' 'What became of his body,' says Raleigh, 'whether it were buried in the sea or on the land we know not: the courfort that remaineth to his friends is, that he hath ended his life homomonably in respect of the reputation won to his nation and country, and of the fame to his posterity; and that, being dead, he hath not outlived his own honour.' A few days after the fight a great storm arose from the west and north-west, in which fourteen Spanish ships, together with the Revenge and in her 200 Spaniards, were east away upon the Isle of St Michaels, besides fifteen or sixteen more upon the other islands. 'So it pleased them to honour the burial of that renowned ship the Revenge, not suffering her to perish alone, for the great honour she achieved in her lifetime. 'Hardly,' says Fronde, 'as it seems to us, if the most glorious actions which are set like jewels in the history of mankind are weighed one against the other in the balance, hardly will those 300 Spartans who in the summer morning sat combing their long hair for death in the passes of Thermopyle have earned a more lofty estimate for themselves than this one crew of modern Englishmen.

This great exploit was told in noble English by Sir Walter Raleigh in A Report of the Truth of the Fight about the Res of Azores, this last Sommer (1591); in good verse by Gervase Markham, in The Most Honorable Trugedie of Sir Richard Grinuile, Knight (1595); by Jan Huygen van Linschoten, in his diary (Dutch, 1596; Eng. 1598), the three reprinted together by Alber (1871); by Froude, in 'England's Forgotten Worthies,' in the Westminster Review for July 1852, since included in the first volume of his Short Studies on Great Subnets: and by Tenuvson of his Short Studies on Great Subjects; and by Tennyson in The Revenue, the noblest heroic ballad in the English tongue—set not unworthily to music in Villiers Stanford's cantata produced at Leeds in 1886.

Sir Richard Grenville was grandfather of the English Bayard, Sir Bevill Grenville (born 1595), the hero of Hawker's spirited ballad, who was killed at the battle of Lansdown, near Bath, 5th July

Grenville, William Wyndham, Lord Grenville, third son of George Gienville, was boin 25th October 1759. After studying at Eton and Oxford,

he became in 1782 a member of the House of Commons and secretary to his cldest brother, Earl Temple (afterwards Marquis of Buckingham), just appointed Lord-lieutenant of Ircland. Soon after he became Paymaster-general of the Army, and in 1789 was chosen Speaker of the House of Commons. But in 1790, on his appointment as Secretary of State for the Home Department, he was raised to the pecrage with the title of Baron Grenville. He became Foreign Secretary in the ensuing year. He resigned office, along with Pitt, in 1801, on the refusal of George III. to give his assent to the Catholic Emancipation Bill, of the aims of which Grenville was one of the principal supporters. In 1806 he formed the government of 'All the Talents,' which, before its dissolution in the following year, passed the act for the abolition of the slave-trade. From 1809 to 1815 he acted along with Earl Grey, and he generally supported Canning. Lord Grenville was an able speaker and an excellent scholar, and, though he was not of first-rate abilities, his consciontiousness, industry, and knowledge of affairs gave him much influence among the peers and as a statesman. He died at Dropmore, linckinghamshire, 12th January 1834.

Grenville-Murray. See Murray.

Gresham, Sir Thomas, funder of the Royal Exchange, was born in 1519, the only son of Sir Richard Gresham, an opulent merchant of Norfolk ancestry, who in 1537 was elected Lord Mayor of Lordon. Appendix of the control of the Royal Exchange of the Royal ancestry, who in 1537 was elected Lord Mayor of London. Apprenticed awhile to his uncle, Sir John Gresham, a wealthy London mercer, and then sent to study at Gonville Hall, Cambridge, in 1543 he was admitted a member of the Mercers' Company, and in 1551 was employed as 'king's merchant' at Antwerp. In two years he paid off a heavy loan, entirely restored the king's credit, and introduced a new system of finance. As a Protestant, he got his dismissal from Queen Mary, but, on presenting a memorial of his past services, was soon reinstated. a memorial of his past services, was soon reinstated. By Queen Elizabeth he was in 1559 knighted and appointed for a short time English ambassador at the court of the regent at Brussels. The troubles in the Netherlands compelled him, in 1567, to withdraw finally from Antworp, to which eity he had made more than forty journeys on state service; in one, in 1560, he was thrown from his horse and lamed for life. In 1569, by his advice, the state was induced to borrow money from Lendon merchants, instead of from foreigners, to the great advantage of the mcreantile body. Having in 1564 lost his only son, Richard, in 1566-71 he devoted a portion of his great wealth to the creetion of an Exchange (q.v.), in imitation of that of Antwerp, for the Lendon merchants, who were wont to meet in the open air. Renowned for his hospitality and liberality, he frequently entertained foreign personages of distinction, and erected a magnificent mansion at Osterly Park, near Brentford, where he was visited by Queen Elizabeth. For the endowment of a college in London he directed by his will that his town mansion in Bishopsgate Street should be converted into a residence and lecture-rooms for seven professors, to be salaried out of the Royal Exchange revenues. Gresham College gave place to the Excise Office in 1768, and the lectures were delivered in a room in the Exchange till 1843, when the lecture-hall in Basinghall Street was built out of the accumulated fund. The subjects of lectures (all of which since 1876 are delivered in English only, not Latin) are divinity, physic, astronomy, geometry, law, rhetoric and music. Gresham also provided for the crection and support of eight almshouses, and made many other charitable bequests. He died suddenly, 21st November 1579. See his Life by Dean Burgon (2 vols. 1839). For Gresham's Law, see BIMETALLISM.

Gretna Green, a village of Dunfriesshire, near the head of the Solway Firth, 10 miles NNW, of Carlisle. After the abolition of Fleet marriages by Lord Hardwicke's Act (1754), English persons wishing to marry clandestinely had to get out of England, to which alone that act had reference. Thus the practice arose of crossing the Border into Scotland, where Gretna Green, or Springfield, as the first village, had by 1771 become, in Pennant's words, 'the resort of all amorous comples whose minon the prudence of parents or gnardians probibits.' The 'priest' or 'blacksmith' might be any one—ferryman, toll-keeper, or landlord; his fee might be anything from half a gninea to £100; and 'church' was commonly the toll-house till 1826, and afterwards Gretna Hall. At the toll-house nearly 200 couples were sometimes united in a twelvemonth. Coldstream and Lamberton, in Berwickshire, were chapels-of-ease to Gretna for the castern Border, as also till 1826 was Portpatrick, in Wigtownshire, for Ireland. One of the earliest Scottish runaway matches on record is Richard Lovell Edgeworth's (1763); amongst his successors were Lords Brougham, Dundonald, Eldon, and Erskine, besides mamerous scions of the noble families of Villiers, Fanc, Beanclerc, Coventry, Paget, &c. In 1856 all irregular marriages were rendered invalid unless one of the parties had been residing in Scotland for three weeks previously; this proviso observed, a Gretna Green marriage is still possible. See P. O. Hutchinson's Chronicles of Gretna Green (2 vols, 1844).

Grétry, André Ernest Modeste, composer, was horn at Liège, 8th February 1741, studied at Rome, and settled at Paris, where he became famous as author of more than forty comic operas, of which Le Huron (1768) and Lucile (1769) were the earliest, and Raoul and Richard Caur-de-Lion among the best known. He was made inspector of the Conservatoire, and a member of the Institute; later a pension from Napoleon enabled him to retire to Ermenonville, where, in Rousseau's old house, he died, 24th September 1813. His operas are noted for their rich and bright melody, and did much to form the musical taste of the time. He also wrote Manoires (4 vols. Paris, 1796). See the Lives by Gregoir (1883) and Brenet (1884).

Greuze, Jean-Baptiste, genre- and portraitpainter, was born at Torrnus, near Mâcon, on 21st August 1725. Ho received instruction in art from Gromdom, a painter of Lyons, who took him to Paris, where he studied in the life-school of the Academy, and produced a subject-picture of such excellence—'A Father explaining the Bible to his Children'—that much doubt was expressed as to its being the work of so young an artist. His skill, however, was amply proved by productions which followed, and his 'Blind Man Cheated' procured his admission as an Associate of the Academy in 1755. In that year he visited Italy with the Abbé Gougenot, and on his return exhibited in 1757 several Italian subjects, but having failed to comply with the regulations of the Academy he was interdicted from contributing to the salon. Having painted in 1769 his 'Severus reproaching Caracalla,' now in the Louvre, he was readmitted as a genre-painter, instead of to the higher class of historical painters, and upon this he indignantly withdrew. He was the friend of Diderot, who praised his productions in his criticisms of the salon; but in the days of the Directorate and the classical revival of David his works were little esteemed; and he died in poverty in Paris, 21st March 1805. His art possesses clauming qualities of delicaey and grace, but is marred by its triviality, by the insincerity of its sentiment, and by its pursuit of mere prettiness. Ho is seen at his best

in his domestic interiors with figures, and especially in such fancy studies of girls as 'The Broken Pitcher' in the Louvre, the 'Innocence' and 'Girl with Doves' in Sir Richard Wallace's collection, and the 'Girl with Dead Canary' in the National Gallery of Scotland.

Greville, Charles Cavendish Fulke, writer of memoirs of his time, the eldest son of Charles Greville by his wife, Lady Charlotte Cavendish Bentinck, was born in 1794. He was educated at Eton and at Christ Church, Oxford. Before he was twenty he was appointed private secretary to Earl Bathurst. In 1821 he became Clerk of the Conneil in Ordinary, an office which he discharged until 1860. During the last twenty vears of his life he occupied a suite of rooms in the house of Earl Granville, in Bruton Street, and there he died, 18th January 1865. In advocacy of the completion of the measure of relief to the Catholics by the payment of their clergy he wrote Past and Present Policy of England towards Ircland (1845). His position as Clerk of the Privy-conneil brought him into intimate relations with the leaders of both political parties, and gave him peculiar facilities for studying court life from within—advantages which the shrewd intelligence and enlured versatility of Greville turned to the best account by penning miscellaneous memoirs dealing alike with public and private affairs, and containing many lively, immediate sketches of the distinguished personages of his time, political, social, and literary. The first part of the Memoirs, covering the reigns of George IV. and William IV., edited by Mr Reeve, appeared in 1875. The second part, embracing the period 1837-51, was published in 1885; and the third, 1852-60, in 1887.

Greville, Fulke, poet and friend of much greater poets than himself, was born of a good Warwickshire family in 1554. He studied at Trinity College, Cambridge, afterwards at Oxford, travelled abroad, made a figure at court, was knighted in 1597, and created Lord Brooke in 1620. Ho was mardered in an altercation with his serving-man, 30th September 1628. Several obscure but pregnant didactic poems, more than a hundred so-called souncis, and two tragedies were printed in 1633; his Life of Sir Philip Sidney in 1652.

Gréville, HENRY, the pseudonym of Madame Alice Durand (néc Fleury), who was born at Paris, 12th October 1842, accompanied her father when he was called to a chair at St Petersburg in 1857, and there married Emile Durand, a French professor of law, with whom she returned to France in 1872. Already at St Petersburg she had contibuted romances to the journals; when at Paris she began to issue with almost too great rapidity a series of novels, often bright, vigorons, and original in their pictures of Russian society, but unequal, occasionally feeble, and sometimes even not free from the one fatal fault of dullness. Dosia (1876) received from the Academy the Montyon prize, and was followed by La Princesse Ogheroff (1876), Les Koumiassine (1877), Suzanne Normis (1877), La Maison Maurèze (1877), Les Epreuves de Raissa (1877), L'Amie (1878), Un Violon Russe (1879), Lucic Rodie (1879), Le Moulin Frappier (1880), La Cité Ménard (1880), Perdue (1881), Madame de Dreux (1881), Rose Rozier (1882), Un Crime (1884), Louis Breuil (1883), Idyles (1885), and Cléopâtre (1886).

Grévy, François Paul Jules, President of the French Republic, was born at Mont-sons-Vaudrey, in the Jura, August 15, 1807. He studied law in Paris, and was admitted an advocate, acquiring distinction as the defender of republican political prisoners. After the Revolu-

tion of 184S he was commissary of the provisional government in his native department, for which also he was returned to the Constituent Assembly. While preserving an independent attitude, he usually voted with the Left, and his ability as a speaker soon brought him into prominence. He became Vice-president of the Assembly, and took a leading part in the constitutional debates. He opposed the government of Louis Napoleon, and condemned the expedition to Rome. After the coup d'état he retired from politics and confined himself to the bar, but in 1869 he was again returned as deputy for the Jura. He denounced the Second Empire during its closing days, and in February 1871 was elected President of the National Assembly, being re-elected in 1876, 1877, and 1879. The Monarchists were triumphant from 1873 to 1876, but their schemes were trenchantly attacked by Grévy, who likewise published a pamphlet entitled The Necessary Government. Upon the resignation of Marshal MacMahon in 1879 Grévy was elected President of the Republic for seven years, scenning 563 votes out of a total of 713. Although his presidency was not brilliant, it was frequently marked by much tact, as on the occasion of the hostile demonstration against the king of Spain, on his visit to Paris in 1883. The republic was consolidated and strengthened at home, but the foreign policy of France was inglorious, and in March 1885 President Grévy elo-ed the Tonkin difficulty by concluding peace with China upon his own initiative. In December 1885 Grévy was elected president for a further period of seven years, but he was soon hampered by ministerial difficulties, and resigned on 2d December 1887, being succeeded by M. Carnot.

Grewia, a genus of Tiliaceous trees yielding good bast for ropemaking, &c. in the East Indies. Some yield timber, and others their leaves as folder.

Grey, Charles, Earl, statesman, was born at Falloden, Northumberland, 15th March 1764, and educated at Eton and Cambridge. On attaining his majority he was returned to parliament as member for Northumberland in the Whig interest, and ultimately succeeded to the leadership of the party. He was one of the managers of the impeachment of Warren Hastings, and in 1792 helped to found the Society of the Friends of the People, whose object was the reform of the representative system. Taking advantage of the alarm caused by the French Revolution, Pitt suppressed the society, and at a later period Grey expressed regret for his share in the movement. Grey introduced the fintile motion for the impeachment of Pitt, and took a prominent part in the temporary 'secession' of the Whigs from a parliament which was hostile to reform, and which he and his friends maintained did not represent the nation. He also strongly denounced the union between England and Ireland. On the advent of the Fox-Grenville administration in 1806, Grey, now Lord Howick, was appointed First Lord of the Admiralty, and on the death of Fax he became Foreign Secretary and leader of the House of Commons. Grey was compelled by circumstances to continue the war policy of Pitt. To his honour he carried through parliament the act abolishing the African slave-trade introduced by Wilberforce in 1807. The king quarrelled with his ministers on the Catholic relief question, and as Grey declined to give a promise not to press forward a measure for absolving Roman Catholics in the army and navy from the oath, the government was broken un.

up.
In 1807 he succeeded his father as second Earl Grey. He ably led the Opposition for a period of

420 GREY

eighteen years after the death of Perceval. opposed the renewal of the war in 1815; denounced the coercive measures of the govern denounced the coercive measures of the government against the people; condemned the bill of pains and penaltics against Queen Caroline; defended the right of public meeting; and supported the enlightened commercial policy of Huskisson. He declined to lend any aid to Canning in 1827. Two years later he had the gratification of sceing the Catholic Emancipation Act carried. On the fall of the Wellington administration in 1820 (Evaporace to the account of William IV) 1830. Grey accepted the commands of William IV. to form a government in which he became prime-minister and First Lord of the Treasury. It was understood that parliamentary reform was to be understood that parliamentary reform was to be treated as a cabinet question, and the new premier amounced in the Honse of Lords that the policy of his administration would be one of peace, retrenchment, and reform. The first reform bill was produced in March 1831, but its defeat led to a dissolution and the return of a House of Commons still more thoroughly devoted to the cause of reform. A second bill was carried, which the Lords threw out in October, and riots ensued in various parts of the country. Early in the session of 1832 a third bill was carried in the Commons by various parts of the country. Early in the session of 1832 a third bill was carried in the Commons by au enormous majority, and it weathered the second reading in the Uppor House; but when a motion by Lord Lyndhurst to postpone the disfranchising clauses until the enfranchising clauses had been disensed was adopted, ministors resigned. The Duke of Wellington was charged to form an administration, but upon his failure Grey returned to office with power to create a sufficient number of peers to carry the measure. Wellington now withdrew his opposition, and on the 4th of June the Reform Bill passed the House of Lords. Grey was the chief of a powerful party in the first reformed parliament, but he was not destined long to remain at the head of affairs. One other great measure, the act for the abolition of slavery in the colonies, he carried, as well as a number of clauses until the enfranchising clauses had been disensed was adopted, ministers resigned. The the colonies, he carried, as well as a number of minor reforms; but dissensions sprang up in the cabinet, and in consequence of his Irish difficulties Grey resigned office in July 1834. He now ceased to take any active part in polities, and spent his closing years chiefly at Howick, where he died, 17th July 1845. Grey was a chivalrous, able, and high-minded man. While not in the first rank of parliamentary contents his encoder on those subjects in mentary oraters, his speeches on those subjects in which he was deeply interested frequently attained to real oloquence. Though he was the leader of the aristocratic Whigs, his greatest claim to remembrance in history is the fact that he opened the portals of the Constitution to the people. See George Grey, Life and Opinions of the second Earl Grey (1861)

His son Henry Grey, third Earl, was born December 28, 1802. He was educated at Trinity College, Cambridge, and in 1826, as Lord Howick, was returned to the House of Commons for Winchelsea. He next sat for a briof period for Higham Ferrers, and after the passing of the Reform Bill of 1832 was elected for North Northumberland. He was appointed Under-secretary for the Colonies in his father's ministry, but retired in 1833 because the cabinet would not support the immediate emancipation of the slaves. He subsequently hold for a short time the post of Under-secretary in the Home Department, and in Melbonne's administration of 1835 became Secretary for War In

Lord Russell's Administration. He now took his seat on the cross-benches, and never afterwards held office. He opposed the Crimean war, and at a later period condemned the eastern policy of Lord Beaconsfield. He also frequently adopted a hostile attitude towards Mr Gladstone, to whom he was especially opposed at the general election of 1880. For many years past Lord Grey rarely spoke in the Honse of Lords, but from his retirement he wrote trenchant letters to the Times upon public affairs, and notably on colonial questions. In 1858 he issued his Essay on Parliamentary Government as to Reform; in 1867 he published his father's Correspondence with William IV.; and on various occasions he has printed speeches and letters of his own, including those to the Times on 'Free Trade with France,' which appeared in 1881.

Grey, Sir George, Baronet, English statesman, was the son of the first baronet, and repher

of the great Reform leader, Earl Grey. Born at Gibraltar, May 11, 1709, he was educated at Oriel College, Oxford, where he took a first-class in classics. He was called to the har at Lincoln's Inn in 1826, but relinquished the law after succeeding to the baronetcy in 1828. In 1832 he was returned to the House of Countons for Devouport, which he continued to represent for lifteen years. He was appointed Under-secretary for the Colonies in 1834, having already made his mark in parliament, and Lord Melbonrne reappointed him to the same office in 1835. For some years his chief speeches were delivered in connection with Canadian affairs and the constitutional difficulties in Jamaica. When Lord John Russell brought in a bill for the temporary suspension of the Lower Canadian constitution, Grey ably defended the measure against Mr Raebuck, who had been heard at the bar in opposition to the bill. In 1839 Grey became Judge-advocate, an office which he exchanged in 1841 for that of Chancellor of the Duchy of Lameaster, but the same year he went out of office with his colleagues. When Lord John Russell became premier in 1846, Grey accepted the onerons post of Home Secretary. During the time of the Chartist disturbances he discharged the difficult duties of his office with vigour and discrimination, this being the culminating point of his career as a practical and administrative statesman. He carried in the teeth of much opposition the Crawn and Government Security Bill, a measure providing for the more effectual repression of seditions and treasonable proceedings. The Alion Bill was also under his charge. Owing to Grey's measures in view of the Chartist demonstration in London in 1848, when 150,000 special constables were sworn in, a threatened popular rising was averted. In consequence of the condition of Iroland, Grey carried a measure in 1849 for the further suspension of the Habeas Corpus Act. Three years later the Russell ministry was wrecked on the Milita Bill. At the general election in Angust 1847 Grey was returne

Juno 1854 he accepted the scals of the Colonial Office, and on the formation of Lord Palmerston's

first administration in 1855 took his old post of Homo Secretary. He carried an important

measure on the subject of secondary punishments,

Palmerston he continued in office under Earl Russell, carrying measures for stamping out the cattle plague, for amending the Parliamentary Oaths Act, and for suspending the Habeas Corpus Act in Ireland at the time of the Fenian activity. On the defeat of the Russell-Gladstone ministry in 1866 upon the reform question, Grey's afficial career closed; but he continued to sit in parliament until 1874, when he finally retired from public life. He died at his seat of Falloden, near Alnwick, on September 9, 1882. Grey was not an eloquent orator or a brilliant statesman, but he took high rank for his practical legislative and administrative ability.

Grey, Sir George, K.C.B., governor and commander-in-chief of New Zealand, was born at Lisburn, Ireland, in 1812. He was educated at the Royal Military College at Sandhurst, and on attaining his captaincy undertook in 1837 the exploration of the interior of Australia. In September 1828, he are available and a september 1828. tion of the interior of Austrana. In September 1838 he organised another expedition to explore the Swan River district. He returned to England in 1840, and published his Journals of Two Expeditions in North-western and Western Australia. His enterprise and ability obtained for him, un-asked, in 1841, from Lord J. Russell, then Colonial Secretary, the post of governor of South Australia. In 1846 he was made governor of New Zealand. Both here and in Australia his first task was to acquire the language of the natives, with whom he became more popular than any preceding governor. His government appeared to the authorities at home to be so wise and conciliatory that in 1848 he was made K.C.B. (civil), and in 1854 was appointed governor and commander-in-chief of the Cape of Good Hope. The task of allaying the asperities and irritation left by the anaying was demanded high powers of statesman-ship; Grey was, however, equal to the occasion. Industry revived, and brighter days began to dawn upon the colony. In 1858, however, the Colonial Office interfered with measures which he considered necessary, and he threw up his post and came to England. Public opinion at the Cape was so strongly manifested in his favour that he was requested by the government to resume his governorship. On the breaking out of the Indian mutiny Grey sent every soldier he could spare to the assistance of the Indian government, and the assistance of the Indian government, and received the acknowledgments of the British government and parliament for his promptitude and energy. In 1861 he was again appointed governor of New Zealand, in the hope that he would bring the war then raging in the colony to a satisfactory conclusion. The natives received him with joy and veneration, and he succeeded in him with joy and veneration, and he succeeded in bringing about pacific relations with the Maoris, He resigned his office and came to England in He resigned his office and came to England in 1867, but afterwards returned to the colonies. Grey accepted the office of Superintendent of Auckland in 1875, with a seat in the Legislature, and he strongly but fruitlessly opposed the abolition of the Provinces Act. After its passing his office of superintendent ceased; but in 1877 he became premier of New Zealand, and carried various acts of great practical utility. Grey had almost unbounded influence with the Alaori chiefs, which he would be obtained friendly realitive transfer friendly relations. which he used in cultivating friendly relations between the natives and the white population. He resigned the premiership in 1884, having left an indelible mark upon the history of New having a

She was the eldest daughter of Henry Grey, Marquis of Dorset, who in 1551 became Duke of Suffolk, and of Lady Frances Brandon. The latter was the daughter of Charles Brandon, Duke of Suffolk, by Mary, younger sister of Henry VIII., and widow of Louis XII. of France. Lady Jane was brought up rigorously by her parents, every petty fault punished with 'pinches, nips, and bobs;' but Aylmer (q.v.), her tutor, afterwards Bishop of London, endeared himself to her by his gentleness, and under him she made extraordinary progress, especially in languages—Latin, Greek, French, Italian, and Hebrew. Roger Ascham tells how in December 1550 he found her reading Plato's Phædo in the original, while the rest of the family were hunting. She also sang and played well, and was versed in other feminine accomplishments. In 1553, after Somerset's fall, the Duke of Northnumberland, foreseeing the speedy death of the boy-king Edward VI., determined to change the succession and seenre it to his own family. Jane, not sixteen years old, was therefore married, strongly against her wish, to Lord Guildford Dudley, Northumberland's fourth son, on 21st May 1553; and on 9th July, three days after Edward's death, the council informed her that his 'plan' had named her as his successor. On the 19th, the brief usurpation over, she found herself a prisoner in the Tower; and four months later, pleading guilty of high-treason, she was sentenced to death. She spurned the idea of forsaking Protestantism for love of life, and bitterly condemned Northmeberland's recantation: 'Woe worth him! he hath brought me and our stock in most miserable calamity by his exceeding ambition.' Queen Mary might have been merciful; but Suffely's participation in Wyatt's rebellion sealed the doom of his daughter, who on 12th February 1554 was beheaded on Tower Hill. She was 'nothing at all abashed, neither with fear of her own death, which then approached, neither with the sight of the dead earcass of her husband, when it was brought into the chapel—a sight to her no less than death.' From the scaffold she made a speech: 'The fact, indeed, against the queen's highness was unlawful, and the consenting thereto by me; but touching the procurement and desire thereof by me or on my behalf, I do wash my hands thereof in innocency.
. . . I die a true Christian woman.' With Lord
Gnildford she is buried in the Tower church of St

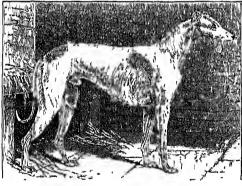
Peter ad Vincula. Soe the articles EDWARD VI. and MARY; also The Chronicle of Queen Jane, edited by J. G. Nichols for the Camden Society (1850).

Greybeards e big-bellied, are narrow-necked stoneware jngs or bottles, made in Flanders about the beginning of the 17th century, and so called from generally generally



Greybeard.

shape; many Egyptian monuments are decenated shape; many Egyptian monuments are decetated with figures of dogs closely resembling the smooth English greyhound. The greyhound has been known in England since the time of King Canute, who confined its use to the nobility by statute. Until comparatively modern times only landowners were permitted to use the greyhound. When the game laws were relaxed, consing became open to all, until now upwards of five thousand greyhounds are kent for while Coursing (a v.) sand greyhounds are kept for public Coursing (q.v.). Clubs were formed for the encouragement of the crims were formed to the electringement of the sport, and a scale of points by which competing greyhounds could be tested was arranged. When it is desired to test two rival greyhounds, they are placed in the hands of the 'slipper,' towards whom the hare are driven. After getting the dogs in a straight line behind the hare, he liberates them by means of a mechanical contrivance, allowing the hare from 50 to 80 yards start. The 'judge,' who follows on horseback, then notes the points scored by either greyhound, giving his decision, from which there is no appeal, at the end of each course. The scale of points adopted is as follows: 'the run.up,' first reaching the bare, one to three points, according to lead gained; 'the time,' eausing the hare to turn at an acute augle, two points; 'the wreneh,' tuning at an obtuse augle, one point; 'the wrenen, mining at an obtuse angie, one point; the go-by,' starting behind a competitor and passing him, two points; 'the trip,' knocking the hare over hut not killing, one point; 'the kill,' not more than two points, sometimes none, according to merit. Many greyhounds, after they have been repeatedly coursed, 'unr cunning' or 'lineh'—i.e. allow their opponent to do all the work, only writing for an apportunity to kill; this vice is waiting for an opportunity to kill; this vice is hereditary, and unist be guarded against in breeding. The greyhound is a large and graceful dog, conveying an impression of great speed. His



Greyhound.

head should be long and narrow, with powerful jaws; shoulders, sloping back, allowing free play for the fore-legs; fore-legs, strong and musonlan; ehest, deep and narrow; hind-legs, very long from hip to hock, and 'well-bent.' The points of the greyhound are neatly summed up in the 15thcentury rhyme:

> The head of a snake, The neck of a drake, A back like a beam, A side like a bicam, The toot of a cat, And the tail of a rat,

which is still a fairly accurate description. The greyhound is rarely kept as a companion, its intelligence not being of a high order. The Russian and Cheassian greyhounds are identical in shape with the English greyhound, but much rougher in coat, and slower. The Italian and Turkish grey-

hounds are shaped very much the same way, but on a very reduced scale; they are used entirely as pets, being too delicate for any active work. See H. Dalziel, The Greyhound. its History, Points, and Breeding (1886).

Greymouth, a rising port of New Zealand, on the west coast of South Island, at the mouth of the Grey River, 190 miles SSW. of Nelson. Extensive harbonr-works, including two breakwaters and the addition of 600 feet of wharf, have been erected since 1885, and railways to Nelson and Christchmel were commenced in 1887. The entire district is an integer, and 55 026 cm. entine district is antiferons, and 55,036 onnees of gald (value £220,503) were expected during 1887-88. Greymouth, however, is famous chiefly for its coal, of which over 130,000 tons, of the best quality in Austalasia, were raised in 1887 in the neighbourhood. Pop. (1886) 3133.

Greystone, a nock term (now disused) for certain light gray lavas intermediate in character between trachytic and basaltic lavas. The grey-stones are probably all varieties of Trachyte (q.v.), but perhaps to some extent of liparite and even of

basalt.

Greytown (San Juan del Norte), the only Nicanaguan port on the Caribbean Sea, is on the northern delta of the San Juan River, which until 1889 was nearly choked with sand. In that year labourers were despatched from the United States to commence work on the interoceanie eanal, of which Greytown is the proposed terminus on the Athentic side, and to construct a breakwater here. Greytown was nentralised under the Clayton-Bulwer treaty, and has been a free pert of Nicaragna since 1860. Pop. 1500.

Greywacke (Get. Granwacke), a partially translated German word, used as the name of an indurated cerimin word, used as the name of an indurated sedimentary took, which occurs extensively among the Palacozoic systems, where it is associated with similarly indurated shales and conglomerates. It is an aggregate of founded subangular and angular grains and splinters of quartz, felspar, and slate, sometimes with mica and grains of ather wincels and color when wheelded in a head of other minorals and rocks, embedded in a hard paste or matrix, which may consist of silicous, calcarcous, argillaccous, or felspathic matter. The rock is generally harder than nost sandstones, and is usually gray or dark blue in colour, but green, red, hown, yellow, and even black varieties are met with. It varies in texture from fine-grained and compact up to conglomeratic and breedifum, and ocears in thick massive beds like liver-rock (see Sandstone), and in thinner beds and layers like ordinary sandstones and flagstones. It represents the muddy sediments of the Paleozoic seas, and often retains ripple-marks, sun-engels, worm burrows and castings, and other superficial markings.

Greywethers, the name given to large blocks of hard sandstone, which are scattered sporadieally over the southern and south-eastern parts of England. The name has probably been suggested England. The name has probably been suggested by their resemblance in the landscape to sheep lying about. Other names by which they are mown are Sarsden Stones, Druid Stones. They are as a rule roughly oblong, and are of all sizes up to 10 or 15 feet in length, and 2 or 4 feet in thickness; and are believed to be the relies of bods of Eocene age which formerly extended over all the region where they occur. These beds all the region where they ocent. These beds probably consisted chiefly of loose sand, &c., the greywethers representing concretionary portions hardened by silicous cement, which have thus withstood the demudation that has swept away the inches of the demudation that has swept away the incoherent deposits of which they once formed a part. The onter ring of monoliths at Stonehenge is formed of greywethers.

Grieg, EDVARD, a Norwegian composer, born at Bergen, 15th June 1843. He was of Scotch descent, his ancestors, Cheigs, having emigrated from Fraserburgh during the Jacobite troubles. Glieg received instruction in music from his mother, till at the age of fifteen, on the recommendation of the Bull, he was sent to the Conservatorum at Leipzig. Thence, in 1863, after a severe illness, he went to Copenhagen, and afterwards to Christiania, where he was settled as a teacher for about eight years, and enjoyed the intimate friendship of Bjornson and Ibsen. He visited Liszt in Rome in 1869. For a while a wanderer, he occupied for some years a romantic but on the Hardangerfjord, and subsequently settled near Bergen. The Norwegian pailiament conferred a pension on him to enable him to devote himself to composition. His works are mainly for the pianoforte, and in small forms, but embrace a sonata and a concerto for pianoforte, three violin and pianoforte sonates, numerous songs, and a few orchestral and small choral pieces. Beyond that of any other composer, his music is characterised by the strongest national peculiarities, extreme gloom and brilliance alternating like the Norwegian summer and winter; its merriment is often wildly elfish in its freaks, and its pathos sometimes has a ghostly weidness. He is as far removed from the commonplace as Chopin. He is of course immensely popular with his countrymen, and the great and growing favon with which he is regarded in England was strongly expressed on his visits in 1888 and 1889.

Grierson, Sir Robert, of Lag, persecutor of the Covenanters, was born about 1640, and succeeded his cousin in the family estates in 1666. He acted for some years as steward of Kirkeud-bright, and carried out the infamous work of harrying the peasantry with such zest and vigour as to leave his name after two hundred years a byword in Galloway for ferocious cruelty. And his brutal speech to Kenmire about a marty's 'Take him, if you will, and salt him in your beef-bariel.' shows the popular tradition to be in harmony with fact. He was brother in law to the Duke of Queensberry, and through his influence was made a Nova Scotia baronet in 1685, and awarded a pension of £200. He was one of the judges of the Wigtown martyrs, and his name survives in infamy upon their tombstone. After the Revolution he was heavily fined and imprisoned for his obstinate opposition, and later was arraigned for his obstinate opposition, and later was arraigned on the shanneful charge of clipping and coining false money, but the case fell through. He died 31st December 1733. A rough but really vigorous piece of verse, lag's Elegy, was current in Dunfitesshire soon after his time, and was admired in the next century by Carlyle. The popular imagination were many a gloomy and awful fancy around Lag's memory, and all the most effective of these Scott worked with marvellous art into 'Wandering Willia's Tale', a magnifector plants of genius. Wilhe's Tale'—a magnificent phantasy of genins.
Old Redgauntlet, with the horseshoe frown upon his brow, and his pre-eminence among the damned in hell, is but a creative realisation of the Laird of Lag traditional in Galloway. See Colonel Fergusson's book, The Laird of Lag. a Life Sketch (1886).

Griesbach, JOHANN JAKOB, author of the first critical edition of the New Testament, was born at Butzbach, in Hesse-Dannstadt, January 4, 1745. He studied theology at Tubingen; at Halle, where Semler influenced his whole after hie; and at Leipzig, where he became acquainted with Ernesti. He commenced lecturing as privat-docent in Halle, and in 1773 was made extra-ordinary professor; but in 1776 he was called as ordinary

professor to Jena, where he continued to teach with great success till his death on 24th March 1812. The great work with which his name is associated is his critical revision of the New Testament text. Amongst his notable works are the Synopsis Erangelrorum (2 vols. 1774-75; 3d ed. 1809); his edition of the whole New Testament (1775; new ed. 1796-1806); Populare Dogmatik (1779; 4th ed. 1789); Commentarius Criticus in Textum N. Test. (1798-1811); and the Opuscula Academica (1825). The grand feature of Griesbach's critical system is his threefold division or classification of the New Testament MSS.: (1) The Alexandrine recension; (2) the Latin or Western recension; (3) the Byzantine or Eastern recension. See Bible; and the Lives by Kothe (1812), Augusti (1812), and Figherald (1815). Eichstadt (1815).

Griffin (Lat. gryphus; Gr. gryps), a chimerical creatme, first mentioned by Aristeas about 500 B.C. The griffin is variously described and remesented, but the shape in which it most frequently appears is that of a cross between a lion and an eagle, having the body and legs of the former, with the beak and wings of the latter, and the addition of pointed ears. Sometimes the four legs are all like those of an eagle, and the head is that of a cock. The figure seems to have originated in the East, as it is found in ancient Persian sculptures. Amongst the Greeks it appears on antiquo coins, and as an ornament in classical architecture. Griffins abound in the legendary tales of the Teutonic

nations, and the name (Ger. greet, Dan. grif, &c.) has passed into most Teutonic dialects. In the bestianics of the middle ages the appearance and of the middle ages the appearance and habits of the griffin were disensed with much particularity; it was the emblem of vigilance, and was understood to gnaid hidden treasures in Griffin Bactria; and the griffin (or gryphon) is still familiarly known to heraldry. As such it appears in the arms of the city of London, griffins being the supporters; and on the removal of Temple Bar a sculptured griffin was greated on the site (Norwayler 1860). For the



was creeted on the site (November 1880). For the Griffin Vulture, see VULTURE—Griffin is a name joeularly given in India to a newcomer from England, a greenhorn.

Griffin, Gerald, novelist, was born at Limerick, 12th December 1803, and early began to write for the papers and magazines. He came to London in 1823, resolved to 'revolutionise the dramatic taste.' Of course he failed to get his tragedies in 1823, resolved to 'revolutionise the distinguished,' Of course he failed to get his tragedies acted, but he was more successful with novels—Holland Tide (1827), Tales of the Munster Festivals (1827), and The Collegians (1828), on which the diama of the Colleon Bawn is founded. These were followed by some dozen more novels and many minor tales. Griffin joined the Society of Christian Brothers, and died in the North Monaston Cook 12th June 1840. tery, Cork, 12th June 1840.

Griffith's Valuation, the main authority for the adjustment of tents under the Itish Land Act, was calculated by Mr (afterwards Sir) Richard Griffith, appointed commissioner to carry out the scheme resolved on by the government in 1825. The results were first published in 1850, and have been much discussed in recent years; but the valuation may be regarded as a most minute and exact basis for equitable taxation and the fixing of fair rents

Grig, or GLUT (Anguilla latirostris), a widely distributed species of cel, found on British and European, Chinese, West Indian, and other coasts. See EEL.

Grigoriopol, a town of Kheison, South Russia, on the left bank of the Dniester, 82 miles NW. of Odessa. Its 7918 inhalitants cultivate tobacco, wine, and fruit, and manufacture leather.

Grille, a lattice, or grating, or screen, or open work of metal, sometimes also of wood, generally used to enclose or protect a window, or some shrine, or tomb, or sacred spot. A grille should be all hammered and punched, without filing. The small screen of crossed iron bars inserted in the door of a monastery or prison, for holding conversation and recommoitring through, is also called a grille.

Grillparzer, Franz, an Austrian dramatic Griffparzer, Franz, an Austrian dramatic poet, for some time popularly regarded as the greatest poet of his nation, was born at Vienna, 15th January 1791, and laboured in the imperial civil service from 1813 to 1856. He died 21st January 1872 at Vienna. Grillparzer first attracted notice in 1816 by a 'fate' tragedy, Die Ahnfrau. His next tragedies, Suppho (1819) and Dus goldene Vlies (1821), the latter a trilogy, are beautiful pieces of work undern in soutiment classic in pieces of work, modern in sentiment, classic in style. And the same features, with that of lyric force added, characterise the dramas Des Meeres und der Liebe Wellen (1840) and Der Trumm ein Leben (1840). Besides these he wrote the historical Leben (1840). Besides these he wrote the historical plays Koniy Ottokar's Glück und Ende (1825) and Ein treuer Diener seines Herrn (1830), with others. In lyrie poetry he likewise produced a gond deal of meritorious work; and he wrote one good prose novel, Per Spielmann. A collected edition of his works, including an antohiography, was published in 10 vols. at Stuttgart in 1872, and another of 16 vols in 1889. See Lives by Faulhammer (1883) and Laube (1884), and Grillparzer als Dichter des Tragischen, by J. Volkelt (1889). A Grillparzer Society was founded at Vienna in 1889.

Grilse. See SALMON.

Grimaldi, Joseph, the typical representative of 'the genuine droll, the grimacing, filching, irresistible clown' of the English pantomine, was born in London on 18th December 1779, the year in which Garrick died. He first appeared on the boards of Drury Lane when one month short of two years old, and in his third year he had his first engagement at Sadler's Wells Theatre, whore he regularly performed (except for one season) down to the date of his retirement from the stage, prematurely worn ont hy sheer hard work, in 1828. He used regularly for some months every year to perform nightly at two theatres, and once he achieved the feat of acting at three different theatres on the same night. He died in London, 31st May 1837. See Memoirs of Joseph Grimaldi, edited by Charles Dickens (1838).

Grime's Dyke. See Antoninus' Wall.

Grimm, Friedrich Melchior, Baron, a clever German critic, who knew every one worth knowing at Paris in the later half of the 18th century. He was born at Ratisbon, 25th December 1723, and after completing his studies at Leipzig, and making an egregious failure with a tragedy, accompanied the young Count de Schönberg to Paris, and soon after became reader to the Crown-prince of Saxe-Gotha. He was still in very straitened circumstances when he became acquainted with Roussean in 1749, and was by him introduced to Diderot, Baron Holbach, and Madame d'Epinay. The intimacy of his relations with this lady cost him later the friendship of the jealous Rousseau. the friendship of the jealous Rousseau. Grimmi quickly became a general favourite, and his connection with the Encyclopédistes, added to his own multifarions acquirements and versatility of mind, opened up to him a brilliant career. He became secretary to Connt Friesen, next to the Duke of Orleans, and now began to write for several German princes those famous literary bulletins which cover about forty years, and con-

tain the most trenchant criticism of all the most important of current French books. In 1776 he was raised by the Duke of Gotha to the rank of baron, and appointed minister-plenipotentiary at the French court. On the breaking out of the Revolution, he withdrew to Gotha, and afterwards to the court of Catharine II. at St Petersburg whence he was sent in 1795 as minister of Russia to Hamburg. He died at Gotha, 19th December to Hamburg. He died at Gotha, 19th December 1807. His Correspondance Littéraire, Philosophique et Critique, extending from 1753 to 1790, was published in three divisions (16 vols. 1812-13); a supplementary volume in 1814. Later editions are those by Tascherean (15 vols. 1829-31), and Tourneux (16 vols. 1878-82). The Correspondance inédite de Grimm et Dideret was published in 1829. See Sainte-Benve, Études sur Grimm (1854); and Edmond Scherer's Melchior Grimm (Paris, 1887).

Grimm. JAKOB LUDWIG KARL, the founder of scientific German philology, and one of the noblest of ancient or modern scholars, was born January 4, 1785, at Hanan, in Hesse-Cassel. He studied law at Marburg, and learnt scientific method from law at Marburg, and learnt scientific method from Savigny, at whose invitation he spent the greater part of the year 1805 in study at Pais. On his return he was appointed to a clerkship in the war-office, and in 1808, private librarian to Jerono Bonaparte, king of Westphalia, who also made him auditor to the council of state. His brother Wilhelm had also by this time settled at Cassel. The first fruit of his studies was the treatise Ueber than Altifactorshap Maintenagana (1811) which was den Altdeutschen Meistergesang (1811), which was followed in 1812 by the first volume of the fameus Kinder- und Hausmärchen, collected by the two brothers—a work which has carried their name over the civilised world in the happiest and most enduring kind of immortality, and has formed a foundation for the new science of comparative Folklore (q.v.). Nor has a contribution to storiology since been made equal in importance to the earliest. The second volume followed in 1814; the third, containing the notes, in 1822. In 1818 Origin, was sceretary to the ambassador of the Grimm was secretary to the ambassador of the Elector of Hesse, whom he attended at Paris, and at the Congress of Vienna. In 1815 he was sent to His brother Wilhelm had already received a post in the Cassel library, and in 1816 Jakob became second librarian under Volkel, on whose death in 1828, the two brothers being disappointed of the first and second places in the library, removed to Göttingen, where Jakob became professor and librarian, and Wilhelm under-librarian. Here for seven years he studied the language, ancient laws, history, and literature of Germany, but never made an effective lecturer. Ho was one of the famous seven professors who protested in 1837 against the abolition of the constitution by the king of Hanover, for which act ho was dismissed, together with his livelies and collised to retire to correct Ive his brother, and obliged to retire to Cassel. In 1840 they were both invited to Berlin, where they received professorships, and wore elected members of the Academy of Sciences. Here Jakob continued his studies with the most single-minded devotion, producing a series of works still unsur-passed for their stupendous emidition. Working up to the last with a devotion undivided by wife or children, he died 20th September 1863.

His Doutsche Grammatik (1819; 2d ed. entirely recast, Gütt. 1822-40) is perhaps the greatest philological work of the age, and may be said to have laid the foundation of the historical investigation. of language. It traces the German language historically through all its dialocts. His Deutsche Rechts-Alterthümer (1828; 2d cd. 1854) and Deutsche Mythologie (1835; 3d cd. 1854; 4th odby Meyer, 1875-78; Eng. trans. by J. S. Stallybrass, 4 vols. 1879-88) are works of exhaustive

erudition upon the society of the middle ages in central Europe, and the religious traditions and superstitions of the Teutonic races from the earliest superstitions of the Tenome races in the cards of times. Only less important is his Geschichte der Deutschen Sprache (1848; 3d ed. 1868), and his Reinhart Fuchs (1834). In company with his brother Wilhelm he published many editions of old German classics, Deutsche Sugen (1816-18; 2d ed. German classics, Detusene Sugen (1816-18; 2d ed. 1865-66); and projected and commenced the great and still unfinished Deutsches Worterbuch (vol. i. 1854; 6 vols. complete up to 1885, with the collaboration of Heyne, Hildebrand, Lexer, and Weigand). The first volume of Grimm's Kleinere Schriften (8 vols. 1867-86) contains an autobiography which reaches between the which reaches graphy which reveals a character entirely free from jealonsy or envy, full of warm human sympathy, and combining in an almost mexampled degree a noble simplicity of life with lofty elevation of purpose. Many collections of his letters have been printed. See the studies by Scherer (2d ed. 1884), Berndt (1884), and those devoted to the two brothers

by A. Duncker (1884) and Schönhach (1885).
GRIMM'S LAW is the name given to the rule which regulates the Lautverschiebung, or permutawhich regintues the Lautverscateding, or permitation of certain primitive consonants, which takes place in the Teutonie languages. The law, as finally formulated by Jakob Grimm, is that if the same roots or words exist in Sanskrit, Greek, and generally in Latin, Celtic, Lettic, and Slavonic, and also in Gothic, English, Dutch, and other Low German dialects on the one hand, and other Low German dialects on the one hand, and in Old High German on the other, the following correspondences are to be expected: (1) Gothic has a soft unite, and High German a hard mite, in place of the corresponding aspirate in Sanskrit and Greek; (2) Gothic has a hard mite, and High German an aspirate, in place of the corresponding set white in Sanskrit and Greek; (2) Gothic has a fard mite, and High German an aspirate, in place of the corresponding soft mute in Sanskrit and Greek; (3) Gothic has an aspirate, and High (ferman a soft mute, in place of the corresponding hard mute in Sanskrit and Greck. Thus, a primitive th becomes d in Low German, and t in High German, as in the words thingater, daughter, tochter. A primitive d becomes t in Low German, and z in High German, as in t in Low German, and z in High German, as in duo, two, zwei; or dens, tooth, zahn; or decem, ten, zchn. A primitive t becomes th in Low German, and d in High German, as in tres, three, drei; or tu, thou, du; or tennis, thin, duin. Similar changes affect the labials and guttnrals, as in pecus, fee, vieh; pater, father, vater; fagns, beech, puocha; and in ornhis, eghe ('eye'), anye; quis, who, wer; or khortos, garden, korto. The normal changes are set forth in the following table:

k g kh (h) k g g(h) ch k

The credit of the discovery of the *Lautverschiebung* is not wholly due to Jakob Grimm. Ihre and Rask had discovered, as early as 1818, the law of the transmutation of consonants in Greek and Gothic, while Grimm, in the second edition of his Deutsche Grammatik, which appeared in 1822, added the corresponding changes in Old High German, and formulated the Law as it now stands.

Grimm's Law may be interfered with by the action of other laws, especially by the position of the accent, as formulated in Verner's Law (q.v.). Thus frater is accented on the first syllable and Inus frate is accented on the first synable and patte on the second, consequently, though we have brother and father in English, we find bruder and vater in High German. The accent in patter has interfered with the regular action of the Lautverschiebung, and prevented the normal change of to d from taking place.

Thus Grimm's Law may be defined as the statement of certain phonetic facts which happen invariably unless they are interfered with by other

variably unless they are interfered with by other

The great use of Grimm's Law, in addition to the identification of words in different languages, is in the detection of loan words. Any etymology which violates Grimm's Law, as qualified by other phonetic laws, must be rejected unless it can be

explained as a loan word.

The causes which brought about the changes formulated in Grimm's Law are obscure. They are probably due to the settlement of Low German conquerors in central and southern Germany.

See Dense's Grimm's Law: a Study of Lautrerschic-bung (1876); Max Müller's Lectures on the Study of Language, 2d series, lecture v. (1864); Morris' Histori-cal Outlines of English Accidence, chap. ii. (1872).

Grimm, WILHELM KARL, brother of the preceding, was born at Hanau, February 24, 1786. Great part of his life has already been told in that of his brother. He was his companion in study at the Lyceum of Cassel, the university of Marburg, and again at Göttingen, where in 1830 he was and again at Gottingen, where in 1850 he was appointed under-librarian and supernumerary professor of Philosophy. He joined his brother in the protest against the king of Hanover, shared his exile, and also his call to Berlin. There they laboured together, and were commonly known as the Brothers Crimm. Under that name also they have a certain immortality in the affections of the children of the civilised world. Wilhelm died 16th December 1859. His carliest independent work December 1859. His carliest independent work was a German translation of the Danish Kæmpr-Viser (1811-13). He edited many old German texts, and co-operated with his brother Jakob in several of his works. His own most important book is Die deutsche Heldensage (1829; 2d ed. 1867). His Kleinere Schriften, ed. by Hinrichs, fill 4 vols. (1881-86), and contain an autobiography.

Grimma, a town of Saxony, on the Mulde, 19 miles SE. of Leipzig by 1ail. It has a town-hall (1442), a former royal castle (now a court-house), a celebrated school (1550, the 'Moldanum Illustie'), and 8292 inhabitants, who support themselves by manufactures and agriculture. See Bora, K. von.

Grimmelshausen, Johann Jacob Christof von, a German novelist of the 17th century. There is some uncertainty as to the date and place of his birth, but in all probability he was born at Gelnhausen in Hesse Cassel about the year 1622. In early boylood he was carried off by a troop of soldiers, and became a soldier himself, serving on the imperial side in the Thirty Years' War up to its close. For several years after the end of the war he seems to have led a wandering life, but ultimately settled down at Renchen, near Kehl, where he held the post of bailiff for the Bishop of Strasburg, and passed the remainder of his days in peace and prosperity, dying Amtmann of the town in 1676. In the leisure of his later life he produced as series of remarkable novels, all the more remarkable for appearing in the sterile period that succeeded the Thirty Years' War. His first attempt was an imitation of Cyrano de Bergerac. or perhaps of Godwin's Voyage of Domingo Gonsales to the Moon, but his best works are on the model of the Spanish picaro, or rogue and vagabond romances, and deal with the abundant materials furnished by his own life. The form was all that he borrowed; the rich lumour, dramatic power, and local colour of his tales are all his own. The sufferings of the German peasantry at the hands of the lawless troopers who overran the country have never been more powerfully pictured than in the opening chapters of Simplicissimus (first printed in 1669), which is evidently autobiographical to a great extent. It was followed in 1670 by Trutz Simplex, the story of an adventuress of the same sort as the Picara Justina of Andres Perez, and Springensfeld, the history of a soldier of fortune, which was

succeeded in 1672 by the Wonderful Bird's-nest, a fanciful production somewhat like Guevara's Diabolo Cojuclo. Besides these Grimmelshausen wrote the Erste Barenheuter, the Galgenmannlein, Simplicissimus's Everlasting Calendar, and three or four other tales or tracts. His writings, especially Simplicissimus, seem to have been very popular in his own time, but to have fallen into neglect in the last century. Their merits, however, have been recognised of late years, and the best of them have been reprinted with introductions and notes—e.g. in the edition of Von Keller (4 vols. Stutt. 1854-62), that of Heinrich Kurz (4 vols. Leip. 1863), and of Julius Tittman (4 vols. Leip. 1874-77).

Grimoire (whence the English gramarye, 'magic'), the French term for the book of formulas which sorcerers used for invoking demons; hence also gibbeish. The older forms of the word (gramaire, gramare) approximate to the Low Latin gramma, 'a letter;' the origin of the word being obvious.

Grimsby, or Great Grimsby, a parliamentary and municipal borough and scaport of Lincolnshire, is situated on the right bank of the Humbor, 20 miles ESE. of Hull and 41 NE. of Lincoln. It consists of two portions: the older, comprising a number of streets irregularly laid out, is at the head of the harbour; and the newer part, called the harbour, is regular along the east side of the harbour, is regular and spacious. The parish clurch, a good cruciform edities in the Early English style, was restored in 1859. A statue of the Princo Consort was unvoiled in 1879, and a public park of 27 acres opened in 1883. In the time of Edward III. Grimsby was a port of considerable importance, which, however, it gradually lost as its harbour became silted up. The town is famous as the largest fishing port in the kingdom, its trawlers and smacks being mostly engaged in the cod, herring, and whelk fisheries. Its importance as a place for the landing of fish dates from 1849-58, when docks began to be constructed under the auspices of the Manchester, Sheffield, and Lincolnshire Railway, which carries the fish to the principal industrial centres of the northern Midlands. The docks cover altogether an area of about 350 acres. The industries of the place include shipbuilding, tanning, brewing, cordage-making, and flax-dressing. About 3500 vessels, with an average burden of 675,000 tons, enter every yoar, and the number and landen. The imports of the port reach the annual value of 4½ millions sterling, and the expect the numeinal value to parliament. Pop. (1851) 12,263; (1871) 28,503; (1881) 45,351, of whom 28,682 were within the numicipal boundary. See works by Oliver (1825) and Davonport (1866).

Grindal, Edmund, Archbishop of Canterbury, was born near St Bees in 1519, and educated at Cambridge, where he was in turn scholar, fellow, and master of Pembroke Hall. Already a prebendary of Westminster under Edward VI., ho lived abroad during Mary's reign, and there imbibed the spirit of Geneva, returning to England on the accession of Elizabeth. On Bonner's deprivation in 1579 he was made Bishop of London, in 1570 Archbishop of York, and in 1575 he succeeded Parker in the see of Cantorbury. His Puritanistic sympathies soon estranged him from the court, and his resolute refusal to put down against his own conscience 'prophesyings' or private meetings of the clergy for mutual help in the interpretation of Scripturo, led to his being sequestered from his functions by the imperious queen in 1577. Not for five years was he restored, and a year later he died at Croydon, July

6, 1583. 'Being really blind,' says Fuller, 'more with grief than age, he was willing to put off his clothes before he went to bed, and in his lifetime to resign his place to Doctor Whitgift, who refused such acceptance thereof. And the queen, commiscrating his condition, was graciously pleased to say that, as she had made him, so he should die an archbishop.' His few writings, with a Life by the Rev. William Nicholson, were printed by the Parker Society in 1853.

Grindelwald, one of the most beautiful valleys (3468 feet) of the Bernese Oberland in Switzerland, about 121 miles long and 4 broad, forms the approach to the two Grindelwald glaciers. The valley (3089 inhabitants in 1880) is recommended as a winter health-resort.

Grinding. See Cutleny.

Gringore, or Ghingothe, Pierre, a favourite French poet under Lonis XII. and Francis I., was bon, perhaps at Caen, between 1475 and 1480, and early became known as a writer of moral and allegorical poems, next of sathical farces abounding in allusions to the social and political circumstances of the time. For the first twenty years of the 16th century he played tho most important rôles in the theatrical society of 'Enfants sams Sonei,' first as Mère-Sotte, next as Princo des Sots; and as such was active in the production and representation of pantonimic satirical farces. He is an important figure in literary history as one of the creators of the French political comedy. He abused the enemies of Louis XII., and thus found cover for his freedoms against the vices of the nobility, the clergy, and even the sacred porson of the popularity, and even the history alone. He died in 1544. The most important among his pieces are Le Jeu du Prince des Sots (1511), directed especially against Pope Julius II.; Les folles Enterprises, a series of half allegorical monologues aimed at the chief existing grievances in church and state; Les Enterprise de l'enise, and La Chasse du Cerf des Cerfs, both political, the title even of the latter being but a dimly-veiled allusion to Popo Julius (Servus servorum Dei); and the famous Mystère de Monscigneur Saint Loys, written about 1524. Gringore's works have been edited by Héricault, Montaiglon, and Rothschild (4 vols. 1858-77). He is the chief figure in a concedy of Banville's, but his description in Hugo's Notre Dume must not be taken as bistorical. See Picot, Pierre Gringoire et les Comediens Italiens sons François I. (Paris, 1878).

Grinnell Land, a barren, mountainous Polar tract on the west side of Kennedy Channel (the northern continuation of Smith's Sound), which separates it from Greenland. It was discovered by Dr Hayes of Kane's expedition in 1854, and named after Henry Grinnell (1800-74), of Now York, who had fitted out the expedition. Greely in 1882 thoroughly explored it. North and south it is covered with ice-caps; between them lie valleys that get quit of their snow in summor, and support herds of musk oxen and the usual Aretic fanna. In the interior ho discovered Lake Hazen, 60 miles long, and two ranges of mountains, one containing a peak (Mount Arthur) 5000 foot high.—Another Grinnell Land, discovered by De Havon in 1850, lies further to the south-west, off the north-west extremity of North Devon Island.

Grinstead, East, an old-fashioned town of Sussex, 36 miles S. by E. of London by rail, which till 1832 returned two members to parliament. Hero is Saekville College, of which Dr Neale was warden, and the convent of the sisterhood of St Margaret, with Homo and Orphanage. Pop. 539.

—West Grinstead is 8 miles to the south-west.

Griping, or GRIPES, a popular name for all painful affections of the howels, whether attended with Constipation (q.v.) or Diarrhea (q.v.). When pains of this kind are spasmodic, they are termed Colic (q.v.). The action of purgative medicine is often attended by more or less of griping pain, which may be averted in certain cases by the careful choice of the medicine, or by combination of it with Carminatives (q.v.), or with a little opium.

Griqualand West and East are two British districts of South Africa, one a part of Cape Colony (q.v.), the other a dependency of it, and named from the Griquas or Bastaards, who are a mixed race sprung from Dutch settlers and native women.—Griqualand West lies to the northeast of Cape Colony, is bounded on the S. by the Orange River, on the N. by Beehmana territory, on the E. by Orange Free State, on the W. by the Kalahari country. Portions of the country are suitable for sheep-farming and agriculture, but the chief source of wealth is the diamond-fields. The first diamond was discovered in 1867, and from that time a steady stream of immigration set in; settlements were formed, all nationalities being represented, and digging was vigorously proseented. Diamonds to the value of above £12,000,000 were found there between 1871 and 1880, and of about £15,000,000 hetween 1883 and 1887. The territory of the diamond-fields had been secured to Waterboer, a native chief, but disputes arising as to his boundaries, Griqualand West was annexed in 1871, and incorporated with Cape Colony in 1880. Kimberley, which has had railway connection with the Cape since 1885, is the chief centre of the diamond industry, and is the seat of government. The chief towns are De Beers, Du Toit's Pan, Bullfontein, Barkly, and Griqua Town. The area of Griqualand West is 17,491 sq. m., and the pop. (1888) 49,000, of whom 17,000 were whites.—Griqualand East is that part of No-Man's-Land which lies between the Kaffir border and southern Natal. It was allotted to the Griqua chief, Adam Kok, who had removed thithor with 15,000 Griquas, and to the Basutos who had previously migrated to that country. This territory was annexed to the Cape in 1875, and is now under colonial rule, having one chief-magistrato and nine subordinates. Chief village, Koksladt. The revenue in 1887 was £22,174, and the expenditure £19,838. Pop. (1888) 98,000; of whites, 2935.

Griselda, or Griseldis, the heroine of one of the most famous medieval tales, which the genius of Boccaccio, Petrarch, and Chancer has made a permanent literary possession of the world. She was the daughter of a poor Piedmonlese peasant, and for her beauty was taken to wife by the Marquis Walter of Saluzzo. To prove her truth and humility, he put her to several cruel tests—tore both her children in succession from her, and at last commanded her to return to her humble hut, as he was about to take to himself another wife. To all her husband's harsh commands she submitted with such unquestioning submissiveness and humility as to make herself for all time 'the flour of wyfly pacience.' The marquis, overjoyed to see her complete devotedness and self-renunciation, took her again to his arms, gave her back the children she had seon earried off to death, and henceforth they lived together in uninterrupted happiness.

The first literary version of the story occurs as the last tale of Boccaccio's Decameron—the tenth tale of the tenth day, written doubtless about 1348. Petrarch wrote a Latin version of it, De Obedientia et Fide uxoria mythologia, written apparently about 1373. It is accompanied by a letter to Boccaccio, in which Petrarch says that the story had always pleased him when he heard it many years before.

The stuff of the story is undoubtedly much older than Boccaccio, and certainly we soon find it widely diffused and highly popular. Reinhold Köhler enumerates as many as sixteen Volksbuch versions in German from the end of the 15th to the middle of the 17th century, all based upon Heinrich Steinhöwel's translation of Petrarch (1471). As a chapbook the story was almost as common in France in the version Le Miroir de Dames, on la Patience de Griseldis, de., to be found in Ch. Nisard's Histoire de Livres Populaires (2d ed. 1864). In England editions of such were entered on the Stationers' Registers in the years 1565 and 1568, and another of 1619 is still extant, under the title, The ancient, true, and admirable History of Patient Grisel, &c., reprinted for the Percy Society in 1842. Substantially the same story also appears in Danish, Russian, and Icelandic folk-tales.

Russian, and Icelandic folk-tales.

The chief poetical version of the story of patient Griselda is that in Chaucer's Clerkes Tale, one of the noblest poems in its series, and recited by perhaps the most attractive figure in the group of pilgrims. Chaucer makes the Clerk say that he had learned the tale at Padua from the lips of Petrarch himself, and in all probability he identifies himself here with the Clerk, and speaks out his own personal experience, as he was absent in Italy on the king's business from the December of 1372 to the November of 1378. The poem is distinctly founded on Petrarch's moralised Latin version, but the poetical treatment of the story is so individual that it all comes afresh from the mind of Chaucer. We have a ballad of 'Pacyent Grissel' in Bishop Percy's Folio MS. (vol. iii. 1868); and we find her painted among the celebrated lovers on the walls of the temple in Lydgate's poem, The Temple of Glass. Indeed the beauty of the story, and its allegorical value as a lesson teaching the duty of submission to the will of God, quickly touched the popular imagination, and the patience of Griselda passed into a proverb, as we see in Shakespeare and Hudibras. Perrault's poem of 932 irregular rhymed verses is the chief poetic elaboration of the theme in French.

in French.

The earliest dramatic representation was an old French Mystery on the subject, composed about 1305. Of more modern plays, it is enough to mention Dekker, Chettle, and Haughton's Pleasant Comedy of Patient Grissel (1599; ed. by J. P. Collier for the Shakespeare Society, 1841); El exempto de Casadas y mueva de la Paciencia, by Lope de Vega; Hans Sachs' Gedultig und gehorsam Markgrèfin Griselda (1546); Goldoni's La Griselda; and Friedrich Halm's Griseldis (1834).

See Reinhold Köhler's article in Ersch and Gruber's Encyklopadie, and Dr Friedrich von Westenholz, Die Griseldis-Sage in der Literaturgeschichte (Hoidelberg, 1888). Petrarch's Latin tale of Griseldis, with Boccaccio's tale from which it was retold, is reprinted in the Chaucer Society's Originals and Analogues of Chaucer's Canterbury Tules, part ii. (1875).

Grisi, Giulia, a celebrated singer, was born at Milan in 1811, and made her first appearance in 1828, at Bologna, in Rossini's Zelmira. Her fame spread rapidly over Europe; in 1832 she appeared in Paris in Semiramis, where the purity, melodionsness, and volume of her voice, as well as her classical beauty of features (Heine wrote of her as 'the singing flower of beauty'), secured general admiration. Bellini's Puritani and other operas were written for her, but Norma always remained her greatest part. London was the scene of hor grandest and most successful performances; and here she matried in 1836 the Marquis de Meley, after whose death she became in 1856 the wife of the tenor, Mario, with whom she sang in America. She died in Berlin, 28th November 1869.

Gris-nez, Cape, a headland (164 feet high) in the French department of Pas-de-Calais, opposite Daver, is the point of land nearest to the English shore, the distance being barely 20 miles. About equally distant from Calais on the north-cast and Boulogne on the south, the cape marks the dividing line between the North Sea and the English Channel. It is surmounted with a light-louse.

Grison (also called Huron), a South American weasel (Galictis vittata), is somewhat larger than the European weasel, and is often kept in captivity.

Grisons (Gev. Graubinden), the largest and the most thinly peopled of the Swiss cantons, is bounded E. by Tyrol and S. by Lombardy. Area, 2773 sq. n.; pop. (1880) 94,991, of whom 43,664 were of German stock, 53,168 Protestants. The whole canton is an assemblage of mountains intersected by narrow valleys. These last form three groups, of which the first and most important lies along the course of the Rhine, and stretches northward, occupying nearly the whole of the western portion of the canton; the second, forming the Engadine (q.v.), extends north-east along the course of the lim; and the third comprises several smaller valleys, whose streams run southward, belonging to the basins of the Ticino and the Adige. Pastures and forests occupy a large portion of the canton; cattle and timber are the principal exports. Numerous mineral springs are found within the cauton; also the health-resorts of Davos, the Upper Engadine, Seewis, &c. Iron, lead, copper, zinc, and silver occur. Within the Grisons too are several passes leading to Italy, such as the Splügen, St Bernardino, Bernina. The canton is democratic in constitution (see SWITZERLAND). The cantonal capital is Clurr or Coire (q.v.).

The country was anctently inhabited by the Rhechi, who are supposed to have been of Etrnsean race (see ETRURIA). It was conquered by the Romans under Angustas, and added by Charlemagne to his empire in 807. During the middle ages the Bishop of Chur was the most powerful of the numerous nobles who sought to oppress the people, till they in self-defence formed themselves into leagues. One of these leagues, formed in 1424, was called the gray league (Ger. der grane bund), from the gray home-spin worn by the unionists, and hence the German and French names of the canton—Granhünden and Grisons. In 1471 these separate unions entered into a general federation, which theu (1497–98) formed an alliance with the Swiss cantons. See works in German by Jeeklin (6 vols.

Coire, 1874-86).

Griswold, Rufus Wilmot, American editor, was horn in Vermont, 15th February 1815. After extensive travels at home and in Europe, he learned printing and newspaper work, next became Baptist preacher, then journalist and compiler of books in turn at Philadelphia, Boston, and New York. The most important paper which he edited during his career, the International Magazine, was afterwards amalgamated with Harper's Magazine. Griswold died in New York, 27th August 1857. His books are numerous; but, despite his industry, he was hut a paor literary critic. Here the following only can be named: Poets and Poetry of America (1842); Poets and Poetry of England in the 19th Century (1845); Prose Writers of America (1846); Female Poets of America (1848); and The Republican Court, or American Society in the Days of Washington (1854). He was one of Poe's excentors, and the Life which he furnished to the edition of his works (3 vols. 1850) has occasioned much hostile criticism.

Grit, a coarse-grained arenaceous rock. Sec SANDSTONE, CARBONIFEROUS SYSTEM.

Grizzly. See BEAR.

Groat (Old Low German grote, meaning great), a name given in the middle ages to all thick coins, as distinguished from the 'hracteates' or thin coins of silver or gold-leaf stamped so as to be hollow on one side and raised on the other. The silver groat enrrent in England (introduced by Edward III.) was equal to four pence. The coin—not the name—was revived (1836-56) in the modern fourpenny-piece. Grosehen, the German equivalent of groats, were till 1873-76 current in the north of Germany, and equal in value to hat hater, worth 13d. or 24 cents United States currency.

or 24 cents United States currency.

Grocyn, William, the first who publicly taught Greek at Oxford, was born at Bristol in 1442, and educated at Winchester and New College, Oxford. He pursued his studies afterwards in Italy, acquiring a knowledge of Greek from the Greek exile Chalcondylas; and settled again in 1492 at Oxford, where Sir Thomas More was among his pupils. When Erasums visited Oxford he lived in Grocyn's house, and he speaks of him as his 'patrouns et precentor.' About 1506 he hecame master of Allhallows' College, near Maidstone, and here he died in 1519.

Grodek, a town of Austrian Galicia, 20 miles SSW. of Lemberg, in the centre of a flax-growing region. Pop. (1880) 10,116, nearly one-third Jews.

Grodno, a town of Russia, on the right bank of the Niemen, 148 miles by rail NE. of Warsaw. It has a medical academy, and manufactures in cloth and tobacco. The new palace, creeted by Augustus III. of Poland, is a handsome edifice. At first a Russian town, Gradno fell to Lithuania in 1241. Here Stephan Bathari died in 1586; here in 1793 the Polish diet ratified the second partition of Poland; and here, too, Stanislans Augustus, the last king of Poland, abdicated (1795). Pop. (1882) 42,238. In the neighbourhood are the mineral springs of Drusskenik.—The province of Grodno (area, 14,926 sq. m.; pop. in 1882, 1,226,946) is an extensive plain, largely covered with pine forests, and in parts swampy. But it is crossed by the ridge that forms the watershed between the Baltic and Black Sca hasins. Its largest rivers are the Bug, Narew, and Niemen. Bye, wheat, oats, notatoes, and tobacco are grown on the fertile soil. The province is a seat of the woollen industry. Trade (in timber, grain, flax, hemp, wool, &c.) is exclusively in the lands of Jews.

Grog, spirits and cold water, without sugar. The quaint name of grog is said to be derived from a nickname of Admiral Vernon, who in 1745 ordered his sailors to dilute their spirits with water. He was known to his men as 'Old Grog' from his wearing grogram breeches.

Groining. See Gornic Architecture.

Grolier, Jean, a famous French bibliophile, was born in 1479 at Lyons. He was attached to the court of Francis I., went to Italy as intendant-general of the army, and was long employed in diplomacy at Milan and at Rome. After his return to France he became Tresorier general, and died at Paris in Octoher 1565. It is his library that has made Grolier famous. He acquired choice copies of the best works then existing, and had them magnificently and tastefully bound, with the generous inscription, Io. Grolierii et Amicoran. He had no less than 3000 books, and of these about 350 have come to light, bound elegantly in brown ealf, both sides ornamented with floral arabesques. The library was dispersed in 1675, and Groliers are now precious prizes to the bibliophile, their prices at anctions varying from 600 to 1200 francs. See

the study by Le Roux de Liney (1866), and Clement de Ris, Les Amateurs d'Autrefois (1876).

Groningen (ancient Cruoninga), the north-eastern province of Holland, bounded N. by the North Sea and E. by Hanover, with an area of 887 sq. m. The surface lies low; the soil is fertile, particularly in the north; in the south-east there particularly in the north; in the south-east there are several maishes, though they are being rapidly drained and cultivated (as the Bourtanger). Farming and grazing are the chief pursuits of the people. Shiphuilding is extensively followed; much butter is exported, and some woollen hosiery, cloth, linen, paper, pottery, and potato-meal are manufactured. The people, 265,687 in 1885, are almost entirely of the Frisian race, and belong chiefly to the Beformed Church. chiefly to the Reformed Church.

Groningen, the capital of the above province, 25 miles by rail SW. of Delfzihl, on Dollart Bay, and 34 E. of Leeuwarden. The university, founded in 1614, with new buildings of 1850, and some 360 students, possesses a library, a botanie garden, an observatory, a collection of Tentonic antiquities, a hospital, and a museum of natural history. celebrated deaf and dumb institution was founded by Guyot in 1790. The chief industries are the by dayou in 1730. The shall industries are the mannfacture of linen and woollen goods, tobacco, brushes, Dutch tiles, and boat-building. Groningen, already an important place in the 9th century, joined the Hanseatic League in 1932. From the 11th century it fought hard to maintain its independence against the bishops of Utreeht, nor did it submit until 1493, and then only to escape being handed over by the emperor to the Duke of Saxony. During the 16th century it had a very stormy history, being finally won for the United Nether-lands by Maurice of Nassau in 1594. Pop. (1876) 40 185. (1890) 54 222 40,165; (1889) 54,332.

Gronovius, the Latinised form of Gronov, the name of a family of scholars of German extraction, name of a family of scholars of German extraction, settled in Holland, the principal members of which were: John Frederic Gronovius, born at Hamburg in 1611, studied at Leipzig, Jena, and Altdorf, became in 1643 professor at Deventer, and in 1658 at Leyden, where he died in 1671. He edited Livy, Statius, Tacitus, Phadrus, Seneca, Sallust, Pliny, and Plautus, and published many works showing a profound knowledge of Roman antiquities, among them his Observationes of Commentarius de Sestertiis,—James Gronovius, son of the arius de Sestertiis .- James Gronovius, son of the preceding, born at Deventer in 1645, studied parily there and partly at Leyden, occupied for two years a chair at Pisa, was appointed in 1679 to his father's chair, which he held till his death in 1716. His works were his Thesaurus Antiquitatum Greecorum (15 vols. 1697-1702), and editions of Polybins, Herodotus, Cicero, and Ammianus Marcellinus.—Abraham Gronovius, son of the preceding, born at Leyden in 1694, became librarian to the pulicovity and dial these in 1775. He to the university, and died there in 1775. He showed himself worthy of the traditions of his nouse by his excellent editions of Justinus Pomponius Mela and Tacitus.—John Frederick, an eminent botanist, brother of the preceding, was born at Leyden in 1690, and died there in 1760. His works were Flora Virginica (1743) and Flora County (1764). Orientalis (1765).—Laurence Theodore Grouovius, son of the preceding, born 1730, died at Leyden, 1778, author of Museum ichthyologicum (1754-50); Zoophylacium Gronovianum (1763-81); and Biblithian in the state of othēca regni animalis (1760).

Groot, GERHARD (1340-84), founder of the 'Brethren of the Common Life.' See BROTHER-

Groote Eylandt (Duteh, 'great island'), an uninhabited island on the west side of the Gulf of Carpentaria, in North Australia. It is surrounded by reefs, and its interior is hilly. In

extreme length and breadth it measures about 40 miles each way.

Gros, Antoine Jean, Baron, a French historical painter, was born at Paris on 16th March 1771, studied in the school of David, and first acquired celebrity by his picture of 'Bonaparte on the Bridge of Arcolc.' His first great achievement, however, was 'Napoleon visiting the Plaguesmitten at Jaffa' in 1804; and searcely less successful were the 'Battle of Aboukir' (1806) and the 'Battle of Eylau' (1808). Gros also painted several other historical pictures illustrating the several other historical pictures illustrating the achievements of Napoleon; the 'Meeting of Charles V. and Francis I.' in 1812; in 1811-24 an immense work for the cupola of the church of Saint Geneviève; the 'Departure of Louis XVIII. for Ghent' (1815); and the 'Embarkation of the Duchess of Angoulême' (1815). In his later years he returned to the traditionary classic style of painting, and in chagrin at his want of success is believed to have committed snicide. At all events, his body was drawn out of the Seine near Mendon. 27th June 1835. Gros's of the Seine near Meudon, 27th June 1835. Gros's paintings are merked by powerful expression and dramatic movement, but are deficient in delicacy and sentiment. See his Life by Delestre (1867) and Tripier le Franc (1878).

and Tripier le Franc (1878).

Grosbeak, a name applied to not a few highly-specialised finches (Fringillidæ), with thick, heavy, seed-crushing bills, 'so high that their upper contours almost form one continuous curve with that of the head.' The European Hawfinch (q, v.) (Coccothraustes vulgaris) and the American Evening Grosbeak (Hesperiphona vespertina) are good examples. But the name is applied to many other birds—e.g. to the Cardinal Grosbeaks (Cardinalis) and the Rose-breasted Grosbeak (Habia ludovicima).

ana).

Groschen. See GROAT.

Grose, Francis, a famous English antiquary, born at Greenford, Middlesex, in 1781, son of a rich Swiss jeweller settled in England. For some years be held a place in the Herald's College, next became adjutant and paymaster of the Hampshire militia, and, when his easy habits had brought him to the end of his fortune, began to put to profit the favourite studies of his youth and his excellent draughtmanship. His Antiquities of England and Wales (6 vols. 1773— 87) proved a success, and in 1789 he set out on an autiquarian tour through Scotland. His splendid social qualities, his rich humour and good nature, which litted well with his Falstaff-like bulk, made him friends everywhere. Burns made his acquaintance, and has hit him off admirably in his poem, 'Hear, Land o' Cakes, and brither Scots.' The lines 'a chield's among you takin' notes, and faith he'll prent it,' are often quoted by persons ignorant of their original application. Grose crossed over to Ireland to continue the same inquiries, but died suddenly in an apoplectic fit at Dublin, June 12, 1791. Grose's work on the antiquities of Scotland appeared 1789-91; that of Ireland in 1791. appeared 1189-91; that of freight in 1791. Works of exceptional value are A Classical Dictionary of the Vulgar Tongue (1785; new ed. with Memoir by Pierce Egan, 1823), and A Provincial Glossary (1787). Other works are his Treatise on Ancient Armour and Veapons (1785-89); Military Antiquities (1786-88); The Grambler (1791), a collection of amusing essays; and The Olio (1793), a strange hotch notch of jests, verse, and prose essays. hotch potch of jests, verse, and prose essays.

Gross, Samuel David, American surgeon, was

born near Easton, Pennsylvania, 8th July 1805, graduated at Jefferson Medical College, in Philadelphia, in 1828, and in 1835 became professor of Pathological Anatomy at Cincinnati. He was afterwards professor of Surgery in the universities of Louisvillo and New York, and from 1856 to 1882 in Jefferson College. He died in Philadelphia, 6th May 1884. His published works are numerons and valuable, and include a System of Surgery (2 vols. 1859; 6th ed. 1882). Dr Gross was a nember of many medical and surgical societies, both in America and in Europe, was president of the International Medical Congress at Philadelphia in 1876, and received the degree of D.C.L. from Oxford in 1872, and of LL.D. from Edinburgh in 1884.

Grossenhain, a busy town of Saxony, 21 miles by rail NNV, of Dresden. It has manufactures of cloth, buckskin, hosiery, nets, machinery, and cigars. Pop. (1875) 10,686; (1885) 11,544.

Grosseteste, Robert, Bishop of Lincoln, was born about 1175 at Stradbroko in Suffolk, of peasborn about 1175 at Stradbroko in Suffolk, of peasant parentago—Grosseteste (the French for 'greathead;' Lat. equito) being a mere 'to-name.' Educated at Lincoln, Oxford, and Paris, he had for some years been the first teacher of theology in the Franciscan school at Oxford, and had held eight archdeaconries and other preferments, when in 1235 he was elected Bishop of Lincoln. He forthwith undertook in the most vigorous fashion the reformation of always controlling himself thereby hist mation of abuses, embroiling himself thereby list with his own chapter and next with Pape Innocent IV., whom he twice visited at Lyons, in 1244-46 and 1249-50. The pope granted English benefices to 'racal Romans,' who drew indeed the revenues of their office, but never perhaps showed face in the country. This was intelerable to a man like Grosseteste, and he set himself strongly against it, incurring by his boldness a temporary suspension from the exercise of his cuiscount fancsuspension from the exercise of his episcopal funetions, and a continual prenace of excommunication. In the last year of Grosseteste's life, Innocent wrote to him ordering his nephew, a young Italian, to he promoted to the first canonry that should full vacant at Lincoln, and accompanying his injunction with threats. The bishop was filled with indignation, and at once wrote a letter declaring that he would not obey such precepts even though they should issue from 'the highest order of angels,' and likening the pope's nepotism to the sin of Lucifer and Antichrist. Innocent, transported with fury, exampled the bigs of the sin of Lucifer and Antichrist. communicated him; but Grosseteste quietly appealed to Christ's own throne, and troubled himself no more about the matter. The feeling of the English nation sustained him; his elergy went on obeying him as if nothing had happened; and on his death at Bnekden, near Huntingdon, 9th October 1253, Archbishop Boniface himself officiated at his funeral in Lincoln Cathedral. Such is the current account, against which Lingard objects that the mandate came not from the pope but the nuncio; that Innocent, an recoiving Grosse-teste's reply, not only rescinded the order, but adopted measures for the reform of these almses; and that the story of Grosseteste's dying under sentence of excommunication rests on very questionable authority.

Grosseteste often is claimed as a pre-Reformation reformer; but his reforms were in the direction not of dectrine, but discipline. In politics he was a constitutionalist, a friend of Simon de Montfort. His learning was prodigious; Latin, Greek, Hebrew, French, mathematics, medicine, astronomy, mechanics, and music were among his attainments; whilst his knowledge of the Scriptures was profound. Pegge's catalogue of his works, of which only a few have been published, fills 25 closely-printed quarto pages, and exhibits 'treatises on sound, motion, heat, colour, form, angles, atmospheric pressure, poison, the rainbow, comets, light, as well as on the astrolabe, necromancy, and witcheraft.' See Brewer's Monumenta Franciscana

(1858); Luard's edition of Grosseteste's Latir letters (Record Soc., 1862); and Perry's Life and Times of Grosseteste (S.P.C.K., 1871).

Grosseto, a little Tuscan town on the Ombrone, near its mouth, 160 miles SE. of Leghorn by rail, with a fine cathedral and old fortifications. Pop. 3962. Much maish land in the Mareinna has been drained and rendered healthy and fertile.

Grossglockner, the highest peak, 13,458 feet, of the eastern Alps and the centre of the range Hohe Tanern, is situated near the meeting-point of the frontiers of Tyrol, Carinthia, and Salzburg.

Grossnlariacea, or RIBESIACEA, a sub-order of Saxifragacea, including about 100 species, mostly all palacarctic or nearetic. See CURRANT and GOOSEBERRY.

Grosswardein (Magyar Nagy-Varad), one of the oldest towns of Hungary, in the county of Bihar, is situated in a beautiful plain, on the Sabes (Rapid) Körös, 152 miles by rail SSE. of Pesth. Formerly a fortress, it is now the seat of a Roman Catholic and of a Greek bishop, has nineteen churches, and manufactures spirits, oil, vinegar, tiles, matches, pottery, and wine. Pop. (1870) 28,698; (1881) 31,324. In the neighbourhood is the Bishop's Bath, with alkaline sulphur-springs (104°-106° F.). At Grosswardein peace was concluded between Ferdinand I. of Austria and John Zapolya of Transylvania in 1538. It was taken and pillaged by the Turks in 1660, and remained in their hands until its recapture by the Austrians in 1692.

Grote, George, historian and politician, was born at Clay Hill, Beekenham, Kent, November 17, 1794. He was educated at the Charterhouse, and in 1810 became a clerk in the bank founded by his grandfather (a native of Bremon), Mr George Prescott, in Threadneedle Street. He remained in the bank for thirty-two years, devoting all his leisure to literature and political studies. He was an advanced Liberal in political studies. He was an advanced Liberal in politics, and his first literary production was a reply to an article by Sir James Mackintosh in The Edinburgh Review on parliamentary reform. This was succeeded by a small work on The Essentials of Parliamentary Reform. Becoming acquainted with James Mill, Grote ultimately accepted his views on democratic government and church establishments; and many years before the passing of the Reform Bill of 1832 he laboured with a band of other ardent reformers in promulgating the views of Mill and Bentham and opposing both the Whigs and Tories. He further studied James Mill's system of political economy, and was not a little influenced in philosophy by the views of Comte. In 1820 he married Harriet, daughter of Thomas Lewin, of Berley, a lady of considerable literary gifts, and their house in Threadneedle Street became a distinguished centre of political and philosophical thought. Encouraged by his friends the two Mills, John Austin, and Charles Buller, and strongly arged also by his wife, he conceived in 1823 the idea for his History of Greece. Mitford's history he mercilessly dissected at this time in the Westminster Review. Grote became head of the bank in 1830, and his position in the city, combined with his well-known talents, naturally pointed him out as a fitting representative of the Metropolis in parliament. In the election of 1832, consequent upon the passing of the Reform Bill, he stood for the City, and was returned at the lead of the poll. During his first session in parliament he brought forward a motion for the adoption of the vote by ballot, his speech bei

mentary life in 1841. He sat for the City of London in three successive parliaments, but on each occasion by a diminished majority; and when he relinquished his seat the party of Philosophical Radicals with which he was associated had lost much of its influence.

Grote retired from the banking house in 1843, and now devoted himself exclusively to literature, the History of Greece becoming the main object of his life. The first two volumes of the work appeared in 1846, and met with the general favour of all parties. The twelfth volume was issued in 1836, bringing down the subject to the end of the generation contemporary with Alexander, the period originally designed by the author. The history was translated into German and French, and was contranslated in the definition and trench, and was on-fessedly deserving of the high position to which it attained in literature. While it throws new light upon Greek history, and lucidly traces the progress of Hellenic thought, its martial passages are notable for their vigour, and its geographical details for their accuracy. Grote was appointed a trustee of the British Museum, and in 1864 foreign associate of the French Aeademy. He was elected president of University College, and vice-chancellor of London University, which offices he held until his death. In the latter capacity he rendered signal services to the university. In 1865 he concluded an elaborate work on Plato and the other Companions of Socrates, which, with his Aristotle, was supplementary to the History of Greece. The latter work, notwith-standing its lack of imagination, still remains unsuperseded for its graver qualities and for its completeness as an historical picture. In dealing with Plato he was less successful, failing to grasp the lofty idealism of the Greek philosopher; and his study of Aristotle, which gave promise of a closer appreciation, unfortunately remains unfinished. A sketch of Swiss history during the war of the Souderband possesses special of the French Academy. He was elected president during the war of the Sonderbund possesses special interest from its comparisons between the small republics of Switzerland and the city states of ancient Hellas. Grote, who declined a peerage offered him by Mr Gladstone, died June 18, 1871, and was buried near Gibbon in the Poets' Corner in Westwington Albert. His prince works were in Westminster Abbey. His minor works were published by Professor Bain in 1873, with critical remarks on his intellectual character, writings, and speeches; and Fragments on Ethical Subjects, being a selection from his postlumous papers, in 1876.

—Mrs Grote (1792–1878) was the authoress of a Memoir of Ary Scheffer (1860), Collected Papers in Prose and Verse (1862), and The Personal Life of George Grote (1873). See, too, Mrs Grote: a Sketch, by Lady Eastlake (1880).

Grotefend, GEORG FRIEDRICH, the first who found a key to the decipherment of the canciform inscriptions, was born at Münden in Hanover, June 9, 1775, and had his education at the university of Göttingen. He filled scholastic appointments at Göttingen, Frankfort-on-the-Main, and Hanover, and died 15th December 1853. He wrote learned books and papers on Latin, Umbrian, and Oscan philology, coins of Bactria, &c., but made for himself are always force by deciplositive the arms. self an enduring fame by deciphering the enuei-form alphabet—an intuition of genius—first given forth in 1802. Later works on this subject were Neue Beitrage zur Erläuterung der Persepolitun-ischen Keilschrift (1837), and Neue Beitrage zur Erläuterung der Babylonischen Keilschrift (1840). See CUNEIFORM INSCRIPTIONS.—His son, KARL LUDWIG GROTEFEND, an eminent antiquary and historian, was born at Frankfort-on-the-Main, 22d December 1809, studied at Göttingen University, and filled from 1853 a post in the Royal Archives at Hanover. He died 27th October 1874. His works are of the greatest value for numismatics and Roman epigraphy, the chief being Die Münzen

der Griechischen, Parthischen, und Indoskythischen Konige von Baktrien (1839), Imperium Romanum tribatim Descriptum (1863), and Chronologische Anordnung der Athenischen Silbermunzen (1872). His historical papers are mostly contained in the Zeitschrift des historischen Vereins für Niedersachsen (1850-74).—FRIEDRICH AUGUST GROTEFIND, nephew of the great Grotefend, was born at Ilfeld, 12th December 1798, studied at Gottingen University, and afterwards became a professor there. He died 28th February 1836. His writings are mostly solid contributions to Latin philology.

Grotesque, a style of classical ornament, so called, in the 13th century, from its having been discovered amongst the painted decorations found in the exeavations made in the baths of Titus and other ancient Roman buildings, the Italian word grotto applying to any subterrancan chamber. This light, fantastic style was much in favour during the Renaissance.

Groth, KLAUS, a modern writer of Low German, was born at Heide in Holstein, 24th April 1819. After teaching for some time in his native village, he spent six years (1847-53) of literary activity in the island of Femern. It was at this time that he composed his masterpiece, Quickborn (1852, 15th ed. 1885), a collection of poems written in the Ditmash dialect, and dealing with life and nature in Ditmarsh, poems as fresh and simple as nature in Dulmain, poems as tresh and simple as the subjects that inspired them. A continuation was published in 1871. Both in Quickborn and in the prose village tales Vertellu (1855-59) Groth used Low German with great skill and ease, and with a fine feeling for its artistic capabilities. His with a fine feeling for its artistic capabilities. His other works in the same dialect are Rothgeter, Meister Lamp in sin Dochder (1862), an idyll; Voer de Goern (1858), children's rhymes; Ut min Jungsparadies (1876), three stories; and Drei Platt-deutsche Erzahlungen (1881). He has also written poems in High German, Hundert Blutter (1854), which are not adjudged so successful as his Low German efforts. A warm lover of his native tongue, he claims for it a co-ordinate place with High German in the polity of languages, and has proceed German in the polity of languages, and has urged his views in Briefe über Hochdeutsch und Plutt-deutsch (1858) and in Mundarten und Mundartige Dichtung (1873). After five years' wandering in Germany and Switzerland, Groth began to teach' German language and literature at Kiel in 1858, and in 1866 was nominated professor of the same subjects at the university there. See Eggers, Klaus Groth und die platticutsche Dichtung (1885).

Grotius, Hugo, or Hug van Groot, Dutch jurist, was born at Delft, 10th April 1583. An extraordinarily precocions boy, Grotius entered the university of Leyden in his eleventh year, and nniversity of Leyden in his eleventh year, and there he enjoyed the advantage of studying under Joseph Scaliger. When only fifteen years old he entered public life, accompanying Olden Barneveldt, the grand-pensionary, on an embassy to France, where, notwithstanding his extreme youth, his talents and conduct gained him the favour of Henry IV. On his return next year he began to practise as a lawyer in the Hagne; in 1607 he was appointed a provincial fiscal-general, and in 1618 pensionary of Rotterdam. But the religious disputes hetween the Remonstrants and their onnoputes between the Remonstrants and their opponents were now at their height in Holland; Olden Barneveldt was the protector of the former, and Grotius supported them by his writings and influence. These theological strifes had, however, a political significance also. In 1618 Barneveldt and Grotius were arrested, tried, and coudemned by the dominant party under Prince Maurice (see BARNEVELDT), Barneveldt to death, and Grotius to imprisonment for life in the castle of Lovenstein. He escaped, however, by the contrivance of his

wife, who managed to have him carried out of the castle in a chest used for the conveyance of books and linen, while she remained in prison in his stead. Grotius found refuge at Paris in 1621, and Louis XIII. bestowed upon him a pension of 3000 livres. But ten years later this pension was withdrawn from him. From his youth upwards Grotius had been a diligent student of jurisprudence; in 1604 he wrote a work entitled De Jure Preda, which, however, he did not publish, but which he seems to have steadily improved year after year, until finally he issued it as his masterpiece, De Jure Belli et Pacis, in 1625. This work, a piece of most excellent scholarship, at once established its place as a standard authority on international law, and such it remained for several generations (see International Law). In 1634 Oxenstierna and Queen Christina induced Grotins to enter the Swedish service as ambassador at the French court, a post which he held until 1645. On his retirement he proceeded to Stockholm; but, finding the court as uncongenial as the climate, he betook himself to Germany, and whilst travelling towards Lübeck was taken ill and died, at Rostock, 29th August 1645.

To the talents of an ablo statesman Grotius united deep and extensive learning. He was a profound theologian—perhaps the best exegete of his day—a distinguished scholar, an aente philosopher, a judicious historian, and a splendid jurist. He was one of the best modern writers of Latin verse, and likewise composed poems in the Datch language. His best historical work is Annales et Historica de Rebus Belgiris (1637), written in a stylo that recalls Tacitus by its coneise and pointed power. His theological productions bear tho titles Annotationes in Vetus Testamentum (1641–46); and De Veritate Religionis Christianae (1627), translated even into soveral oriental languages, and remarkablo for its elear arrangement, vigorous logic, and graeoful stylo. It is an olegant troatise on Christian apologotics. Lehmanu's Hugonis Grotii Mancs Vindicati (1727) contains a good life and a complete bibliography of his works. See also Hély, Étude sur le Droit de la Guerre et de la Paix de Grotius (1875), and Butler's Life (1827). The De Jure Belli was translated into English by Whewell in 1853.

Grotta del Came ('Grotto of the Dog'), a small cave near Naples, in the vicinity of Lake Agnano and of Pazzuoli, contains carbonic acid gas with 77 per cent. of carbonic acid. This cave was known to the ancients, and is described by Pliny. It derives its name from the practice of introducing into it small dogs, which are soon almost deprived of life by the gas that owing to its density clings to the floor of the cave; but they soon recover upon being restored to the open air.

Grottaglie, a town in the Italian province of Leece, 12 miles ENE. of Taranto, with \$880 inhabitants, who carry on wine-growing, bco-keeping, and silk and cotton weaving.

Grotte, LE, a town of Sieily, in the province of Girgenti. Pop. 8775, mostly employed in the snlphur-works of the district.

Grouchy, EMMANUEL, MARQUIS DE, French general, born at Paris, 23d October 1766. Entering the army at fourteen, he threw in his lot with the Rovolution, and had his first taste of serious work in helping to suppress the Vendean revolt. After being nominated second to Hoche for the abortive expedition to Ireland, though Gronchy did enter Bantry Bay, he proceeded to join Jonbert in Italy in 1798. Under Moreau, he greatly distinguished himself in Piodmont, and at Novi was

taken prisoner, but subsequently exchanged (1799). Later he fought with conspicuous gallantry at Hohenlinden, Eylau, Friedland, Wagram, and in the Russian campaign of 1812, being appointed during the memorable retreat leader of the 'sacred' bodygnard of Napoleon. After the disastrous battle of Leipzig, Gronehy covered the retreat of the French on the west side of the Rhine. Amongst the first to welcome Napoleon after his escape from Elba, Gronehy destroyed the Bourbon opposition in the south of France, and then, hastening north, routed Blücher at Liguy. After the defeat at Waterloo and the second abdication of Napoleon, Gronehy, appointed by the provisional government commander-in-chief of the broken armies of France, led them skilfully back towards the capital; then, resigning, he betook himself to the United States. He returned from exile in 1819, and was reinstated as marshal in 1831. His death ocentred at St. Etienne on 29th May 1847. See his Memoires, edited by his grandson (5 vols. 1873-74).

Ground-annual, in the law of Scotland, is an annual payment, sometimes called a rent-charge, made for land. It may be regarded as a substitute for fen-duty, and is little known where the law allows the constitution of a fen-duty. Thus, when a vendor sells his land, and instead of taking a lump sum for the price, prefers a sum by way of a perpetual annuity or rent, he conveys the land in fee to the disponee or purchaser, subject to this ground-annual, which is a burdon on the lands transferable and extinguishable like other real burdens. The vendor is then called the ground-annualer, and if the ground-annual is not paid he is entitled as a remedy to poind the ground—i.e. soize all the goods, whether of the owner or his temants, which are found on the lands, and pay himself, and raise action of mails and duties against the temant, or he may sue the debtor.

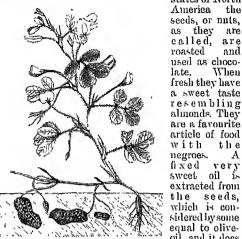
Ground-game. See GAME-LAWS, Ground-ice. See Anchor-ice.

Ground-ivy (Glechóma hederacea, united with the genus Nepeta by some botanists as N. Glechómu), a plant of the intural order Labiatre, a common native of Britain and other parts of Europe, growing in waste places, plantations, hedges, &c., in a dry soil. It has a creeping stem, kidnoy-shaped erenate leaves, and axillary blue flowers growing in threes. A tea prepared from the leaves is in great repute among the poor in many places, and the plant is supposed to be stimulant, aromatic, and of use in pectoral complaints. The leaves were formerly used in England for clarifying and flavouring ale, which was then called Gill-ale or Gell-ale, from Gill or Gell, an old name of this plant; but this use has been discontinued since the introduction of hops.

Groundling (Cobitis tania), the spinous leach, a little exprincial fish resembling the leach, from which it is distinguished by a forked erectile spine beneath the eye, and by its more compressed form. It is rare and very local in Britain, frequenting the muddy parts of rivers, habitually keeping close to the lotton. The genus is known to include only two other species.

Ground-nut, Ground-bean, or Pea-nut, the fruit of Arachis hypogea, an annual plant belonging to the natural order Leguminose, extensively enlitivated in southern North America, but supposed to be a native of Africa. The name Arachis, Aracos, or Aracidna, was given by Pliny to a plant which was stemless and leafless, being all root. Modern botanists have given the name to a species which ripens its fruit underground. The pods, though first formed in the air, are as they increase in size forced into the earth by a natural

motion of their stalks, and there come to maturity 3 or 4 inches under the surface, hence the popular name Ground- or Earth-nut. In the southern states of North



which is considered by some equal to oliveoil, and it does Ground-nut (Arachis hypogaa). not become raneid, rather Ground-nuts are to be met improving with age. Ground nuts are to be met with occasionally in fruiterers' shops in Britain, and some attempt has been made to cultivate the

plant around Paris; but requiring as it does to be reared in hot beds, expense and trouble have circumscribed its adoption as a commercial production there. It is, however, cultivated in some of the warmer countries of the south of Europe.—The roots of Bunium bulbocastanum and B. Acxuosum are also known as ground-nuts or Earth-nuts

(q.v.),

Ground Pigeon, a name widely applied to those immerous pigeous (Columbide) which are terrestrial rather than arboreal. The more thoroughly ground-loving forms have short and rounded wings, and lessened power of prolonged flight, but possess long legs and a rapid page. See Elliot, Standard Natural History, vol. iv. (Boston, 1887), for a characteristic property of the company of the compa 1885), for an admirable account.

Ground-rent, in the law of England, is the rent which a person, who intends to build upon a piece of ground, pays to the landlord for the use of the ground for a certain specified term, usually ninety-nine years. The builder usually pays a certain annual sum by way of rent to the owner, who is thereafter called the ground-landlord, and then commences to build upon the land. builder then lets the houses, and in doing so he of course includes in the rent which he puts upon each house a proportionate part of this ground-ent, which he himself is bound to pay to the ground-landlord, so that practically the tenant pays both the rent and the ground ent, the latter being so called because it issues out of the ground, independently of what is built upon it. Ground-rents often form a safe investment for capital, because the security is good. This security con-sists in the ground-landlord being able, whenever his ground-rent is in arrear, to distrain all the goods and chattels he finds on the premises, to whomsoever they may belong; and as the ground-rent is generally a small snin, compared with the furniture of the tenant, he is always sure to recover its full amount. This power of distress exists (except in the case of lodgers) whether the tenant has paid his rent to his own landlord or not; but if at any time the tenant has been obliged to pay the ground-rent which his landlord ought to pay,

he may deduct such sum from the next rent he pays, and set off the one against the other so far as it will go. At the end of the nincty-nine years, or whatever other term is fixed upon, the building becomes the property of the ground-landlord, for the interest of the builder (or mesne landlord as The value of the property thus reverting to the ground-landlord is often greatly increased by unnicipal improvements effected at the expense of the rates—i.e. at the expense of the occupier who pays the rates. The instice of this arrangement is open to question, and the case for a readjustment of rates is generally admitted to be a strong one. There are some politicians who announce that they will accept this reform as a mere instalment; their ultimate aim is to 'nationalise' the land by taxing ground-nents at the rate of twenty shillings in the pound.

Ground-rent corresponds to feu in Scotland, with

this difference, that the fen-rent in the latter case lasts for ever, there being no definite term fixed for

the

are

are

and

When

taste

the

oil is

ealled,

Groundsel, the common name of those species of Senecio (q.v.) which have small heads of flowers either destitute of ray or with the ray rolled back. The Common Groundsel (S. rulgaris), which is usually destitute of ray, is one of the most plentiful of weeds in waste and cultivated grounds in Britain and most parts of Europe, and now also diffused, through European commerce and colonisation, throughout the world. It is a coarse-looking annual, of rapid growth, about a foot high, branched, with pinnatifid leaves, and smull yellow heads of flowers; flowering at all seasons, even in winter, when the weather is mild, its scele being winter, when the weather is mild; its seeds being also widely diffused by means of their hairy pappus. It has a rather disagreeable smell; but birds are very fond of the young buds and leaves, and cage-birds are fed with them. It is also eaten by cattle birds are fed with them. It is also eaten by cattle if better fodder be searce. It has a saltish taste, whence its name; and is of old repute in domestic medicine for ponlicing. The other British species are weeds of very similar appearance, but are stronger, having a more disagreeable odour, and are viscid to the touch. Groundsel has been introduced into the United States, and is now found as a weed in gardens and waste places from New England to Pennsylvania.—Like other annual weeds, the groundsels ought to be hoed down or pulled as they appear, when the ground is in crop.

Ground Squirrel. See Chipmunk.

Grouse, a name applied to many game-birds in the family Tetraonide, which also includes quails and partridges. From these the grouse (forming a sub-family Tetraonina) may be distinguished by the more or less complete feathering of nostrils, legs, and feet, by a bare patch of skin over the eye, by a comb-like fringe on the sides of the toes, and sometimes by a distensible sac on the side of the neck. They are well known to be large, plump, somewhat heavy birds, usually short-tailed, and with beautifully-variegated plumage, which must often be protective. They are especially abundant in the northern parts of both Old and New World.

We shall first take a brief review of most of the important forms, some of which receive separate notice. (1) The genus Tetrao is well represented by the Capercailzie (q.v.; T. wrogallus), its Siberian relative T. urogalluses, and the Black-cock (q.v.) or Black Grouse (T. tetrix), well known in Britain. (2) The Ptarmigans (q.v.) belong to the genus Lagopus, distinguished by their heavily-feathered toes, and (with the exception of the next species) by the snow-white winter plumage. The species) by the snow-white winter plumage. Red Grouse (L. scoticus) is indigenous only to

434 GROUSE

Britain, represented by the Willew Grense (L. albus) in other northern countries. (3) The ruffedgrouse, in the genus Bonasia, are exceptional in having the lower part of the leg bare, and can elevate the soft feathers on the sides of the neck. Well known is the American species B. umbellus, with several varieties. They frequent woods, roost in trees, nest on the ground, and By straight and swiftly. The male is famous for his habit of 'drumming,' 'He stands upon a tunk of some fallen tree, and, stretching himself into a horizontal position, beats stilly downwards with his wings, slowly at first, increasing the strakes until they become se rapid that the wings are invisible.' This loud drumming noise is heard even after the limits of the breeding season. An allied species, the Hazel Gronse (B. betulina), is widely distributed in Europe and Asia, but is without ruff or drumming. Along with two other species it is sometimes ranked in a separate genus, Tetrastes.

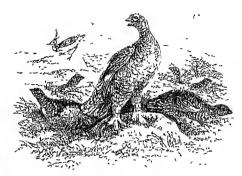
(4) Among the minerous North American gionse,

(4) Among the immerous North American grouse, besides species of Bonasia and Lagopus, there are first of all several forms nearly related to, if not included within the genns Tetrao. The 'Blue Grouse' (Dendragapus) inhabit evergreen forests at a high elevation; the males emit in spring a prolonged whirring saind from the contraction of two dilatable sacs on the neck. The flesh is white and delicate. The Spruce Grouse (Canace) are represented by several species—'forest- and swamp-loving birds, very tame and memspecious, with dark and generally bitter flesh.' Well known are the Prairie Hens or Prairie Chiekens, of which Copidoma, or sometimes Tetrao cupido, is the commonest, though in process of rapid extermination even in spite of the laws. It is rather smaller than a blackcock, reddish-brown in colour, with beautiful markings of black and white, and bears on the sides of the neck two large dilatable sacs, hidden by creetile feathers, and producing by their expansion and contraction loud 'booming' sounds, which, as well as the combats between rival males, enliven the breeding season. The flesh is much esteemed, and the bird is ruthles-ly persecuted. Nearly related, but with less-developed neck sacs, is the sharp-tail grouse, referred to the genus Pedlicectes. The largest American grouse, however, is the Cock of the Plains or Sage Cock (Centrocreus uraphasianus), the male of which approaches our capercalizie in size, though not by any means in weight. It is dispersed over the western plains, and, according to Elliot, owes the bitter unpalatable character of its flesh to its diet of Artennisia or 'wild sage' which abounds in these desert regions. The tail is remarkably long, the neck sacs very large, the usually hard gizzard portion of the stomach remains soft. As the Sandgrouse (Pteroelide)—one of which, Pallas's Sandgrouse (Syrrhaptes paradoxus), has been eming in increasing mumbers to Britain since 1859—are not grouse, if indeed even gallinaceons, they must

not growe, it indeed even guillinescents, they have be noticed separately.

Returning now to British gronse (Tetracuidae), we have to deal with (1) the Capercailzie (Tetracurogallus), (2) the Blackcook (T. tetrize), (3) the rare Ptarmigan (Lagopus mutus), and (4) the Red Grouse (L. scoticus). The first three are separately discussed; it remains to notice briefly the last, which is in a special sense the British gronse. This is strictly an insular ptarmigan which does not change its colour, and is very nearly related to the Willow Gronse (L. albus) of the Continent. It is widely distributed on the moors in the north of England, in Ireland, but above all in Scotland. The male measures 16 inches, and is predeminantly reddish and chestnut-brown with some black and white. The female is rather smaller, and with more of the light chestnut plumage. The colour

varies considerably in different localities. Pairing occurs in early spring; the nest is slight, and on the ground usually among heather; the eggs (eight to ten) are 'of a builtsh-white ground colour.



The Red Grouse (Lagonus scoticus).

mottled with rich red or brown.' The female sits very close, and the male gives warning of danger. The birds feed on leaves and fruit of bilberry, tips of heather, sedge seeds, and the like.

Grouse are well known to be subject to a decimating disease, but neither in regard to the direct or indirect conditions of the epidemic is there any certainty. It was first noticed (1815-20) about the time when shootings began to be let and protection or over-preservation became common. Atmospheric conditions, sheep, sheep-wash, heather-blight, &c. have been blaned, while John Colquionin, anther of The Moor and the Lock, strongly maintained that the indirect cause was simply over-preservation. The destruction of birds of prey, which used to kill off unhealthy birds, must certainly have its nemesis. Tapeworms are often found in grouse, but are not regarded as of much import; a round worm (Strongylus) is possibly more injurious; most probably, however, the disease is due to bacteria of some sort, and runs rich in unmatural conditions.

Grause-shooting has long been a popular sport with those living where the birds abounded, but it was not till near the middle of the 19th eentury that Southrons began to flock into Scotland for this sport, and shooting rents to grow rapidly. In many districts the 12th of August is the most important date in the year. Many thousands of acros now bring their owners large rents for grouse-shooting; there are said to be in Scotland in all, besides deer-forests, some 2400 separate shootings, on most of which grouse are found. Grouse ceen in every Scotlish county, but Perthshire is the chief grouse-shooting region. An area of 10,000 acros well stacked with birds, and having a shooting lodge, can hardly be leased for less than £500 per annum (Outdoor Sports in Scotland, 1889); if there be salmon and ground-game, the rent may be £600. The rents may be said to run from tenpence to half-a-crawn an acre. In a good season, 500,000 brace may be shot. It is computed that every brace costs the sporting tenant a sovereign. Hence if each of the 2400 grouse-moors yield each on an average 200 brace, the total (960,000 birds) would represent a grouse-shooting rental for Seetland of £480,000.

See Blackcook, Capthealizh, Ptarmigan, Sandgroush; also D. G. Elhot, The Tetraonine (New York, 1864-65); also in The Riverside or Standard Natural History, edited by J. & Kingsley (Lond. and Boston); A. B. Meyer, Unser Auer-, Rackel-, and Birkvild (Yienna, 1887, folio atlas with 17 plates of grouse); R. W. Shufeldt, Osteology of North America Tetranonida; Bull, U.S. Gcol. Geopr. Surr. vi. (1881); manuals of Yanell, Howard Sannders, &c.; Colquboun, The Moor and the Loch (1851, 6th ed. 1884); Lord Walsingham and Sir R. Payne-Gallwey, Shooting (Badminton Lib. 1886); 'Ellangowan,' Outdoor Sports in Scotland (1869). For disease, see F. J. Bell, Zoolonist, 1887, p. 205; Rep. Brit. Assoc. 1887, p. 770; Journ. Roy. Mar. Sec. 1887, p. 699; Abel Chapman, Bird Life on the Borders (1889).

Grove, Sin George, horn at Clapham in 1820, was trained as a civil engineer, and erected in the West Indies the first two cast iron lighthouses huilt. As a member of the staff of Robert Stephenson, he was employed at the Chester general station and the Britannia tubular bridge. He was secretary to the Society of Arts from 1840 to 1852, and secretary to the Crystal Palace Company from 1852 to 1873, where he subsequently became a director. It is for his services to literature and music that Sir George is best known. As editor of Macmillau's Magazine, as a large contributor to Smith's Dictionary of the Bible, and as editor (and part author) of the great Dictionary of Music and Musicians (4 vols. 1878-89), he has served the reading public; and these and his zeal and success in promoting the love of good music seemed for him the degree of D.C.L. from Dulham University in 1872, and LL.D. of Glasgow in 1886. He was knighted in 1883 on the opening of the Royal College of Music, Kensington Gore, of which he was made Director by the Prince of Wales—a post which he still occupies. He also assisted Dean Stanley in some of his works on the Bible and the East, and was founder of the Palestine Exploration Fund.

Grove, Sir William Robert, lawyer and physicist, was born at Swansea, 11th July 1811. He studied at Brasenose, Oxford, and in 1835 was called to the bar; in 1871 he was raised to the bench, receiving knighthood in 1872; and by the Judicature Act (1875) becoming a judge in the High Court of Justice. He retired from the bench in 1887. He greatly distinguished himself in the subjects of electricity and opties, and was professor of Natural Science at the London Institution from 1840 to 1847. In 1839 he invented the powerful voltaic battery known by his name. He has contributed extensively to scientific journals, and published several very important lectures, as those on the Progress of Physical Science (1842), in which he propounded the theory of the mutual convertibility of the natural forces, on the assumption of their all being modes of motion; the Correlation of the Physical Forces (1846), a development of the same views; Voltaic Ignition (1847); and the Continuity of Natural Phenomena (1866). He was president of the British Association in 1866, and is a Fellow of various learned sacieties at home and alroad.

Groves. See Ashera, Tree-worship.

Growler (Grystes salmonoides), a fish of the Perch family, abundant in many of the rivers of North America, as in the neighbourhood of New York. It attains a length of 2 feet, affords good sport to anglers, and is much esteemed for the table. It is of an olive colour, dark on the upper parts, and becoming grayish-white beneath. It receives its name from a sound which it emits. The genus Grystes has small seales, and only fine villiform teeth. Nearly allied is the genus Oligorus, including the valuable Murray Cod (O. macquaricusis) from the Murray and other rivers of South Australia, which may attain a length of 3 feet and a weight of 100 lb., and a New Zealand coast form, the 'Hapukn' (O. gigus), also valuable as a food-fish.

Grub, a name generally applied to the wormlike larvæ of insects when they have a distinct head but no legs—e.g. in bees and some beetles. In distinction therefrom, a larva without distinct head and without limbs, as in Diptera, is a maggot, but with distinct head and limbs, anterior as well as posterior, is a caterpillar. But these are all somewhat rough and ill-defined titles, now replaced by a more exact tenuinology (see INSECTS and LARVA). The economic importance of many grubs, especially those of some beetles, is well known. See CORN INSECTS.

Grubber, an agricultural implement consisting of a framework of east or wrought iron, in which are fixed times or teeth, somewhat like those of a harrow, but curved, and so placed as to enter the ground somewhat obliquely when the implement goes forward; the whole moving on wheels, by which the depth to which the teeth may penetrate is regulated.

Gruber, Johann Gottffeed, German author, hann at Naumburg on the Saale, 29th November 1774, studied at Leipzig, and in 1811 was appointed professor at the university of Wittenheig, and in 1815 professor of Philosophy at Halle. He died 7th August 1851. His chief work was that of editing, first with Ersch, and after his death alone, the first section (A to G) of the Allgemeine Encyklopadic (see Encyclop.edia). Of his independent works we mention Charakteristik Herders (1805), Geschechte des menschlichen Geschlechts (1805), and lives of Wieland (1815–16) and Klopstock (1832); he also edited Wieland's Sammtliche Werkr (1818–28).

Grub Street, thus described in Dr Johnson's Dictionary. 'Originally the name of a street near Moorhelds in London, much inhabited by writers of small histories, dictionaries, and temporary poems, whence any mean production is called Grub-Street.' Andrew Marvell used the name in its opprobrions sense, which later was freely used by Pope, Swift, and the rest. The name has been changed into Milton Street, from the neighbourhood of the Bunbill residence of the poet. One of the most entertaining of the old newspapers is the Grub Street Journal, which ended with its 418th number, December, 29, 1787, the principal writers of which are supposed to have been Dr Richard Russel and Dr John Martyn, and which was used, if not by Pope himself, at least by his party, as a vehicle for attacks against the Dunces.

Gruel is a mild, untritions, easily-digested article of food. To prepare it, put a teacupful of oatmeal into a pint of water; after standing twenty minutes pour off the water, rejecting the coarse parts of the meal; boil the water twenty minutes. It may be flavoured according to taste; butter should not be added if the gurel is meant for invalids. Gruel is more nomishing than preparations from arrowroot, sago, tapioca, and other starely substances.

Griin, Anastasius. Sce Auersperg.

Grünberg, a town of Prassian Silesia, 34 miles NW. of Glogan hy rail, is surrounded by vine-clad hills, and manufactures wine (since 1150), woollen goods, twine, machinery, &c. Pop. 14,396.

Grundtvig, Nikolai Frederik Severik, Danish poet and theologian, was born at Udby, in Zealand, 8th September 1783. He first became known as the author of Northern Mythology (1808; 3d ed. enlarged and revised, 1870) and Decline of the Heroic Age in the North (1809). These were followed in 1814 by the Rhyme of Roeskilde and the Roeskilde Suga, and in 1815 by a collection of patriotic songs (Kvullinger). About the same time he took his stand as a witness against the entrent irreligion and rationalism. As time went on he became the head of a religious seet, the Grundtvigians, who strove to free the church from the interference of the state, and to approximate to

the ideal of independent religious communes. His religious views got firm hold of the hearts of the neople throughout the three countries of Scandinavia. Besides this he was instrumental in raising the educational condition of the peasantry. In 1825 Grundbrig, for a vehennent attack upon one of the chief representatives of the prevalent rationalism, was fined and suspended from preaching, the suspension lasting until 1832. During all these years his pen was never idle. In 1818 he had began the translation into Danish of Snorri Sturluson and Saxo Grammatiens; and in 1820 he published a Danish translation of the Anglo-Saxon poem Becoralf. As a writer of seemlar and sacred poetry he stands high in his countrymen's regards; his son published his Poetiske Shrifter (6 vols.) in 1880-85. From 1839 Grunddrig preached in the church of Vartov Hospital in Copenhagen, after 1861 with the title of bishop, though he held no see. He died 2d September 1872. The works of his later years include The Seven Stars of Unistendom (1860; 3d ed. 1883) and Church Mirror (1871), a collection of addresses.—His son, Syend Hersten Grundtyg, born 9th September 1824, became (1839) professor of Scandinavian Philology at Copenhagen, and died 14th July 1883. He edited Danmarks Gumle Polkevisor (5 vols., 1853-78; since continued); Gamle Danske Minder i Folkemande (2d ed. 1855); Danske Folkeventyr (1876-78); and an edition of Swmund's Edda (1868; 2d ed. 1874).

Grundy, Mrs, the invisible censor morum who is frequently appealed to in the phrase, 'But what will Mrs Grundy say?' in Thomas Morton's play Speed the Plough, first acted in 1800.

Grus and Gruidæ. See CRANE.

Grütli. See Rütli.

Gruyère, a little town of Switzerland, 16 miles SSW. of Freiburg, gives its name to the famous whole-milk Gruyèro cheese, which is made in great quantities in the canton of Freiburg. Pop. 1075.

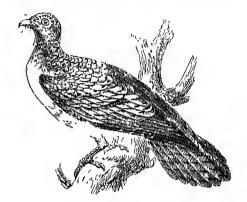
GryHus, a Linnean genus of insects of the order Orthoptera, answering to the section Saltatoria (Lat., 'leapers') of later ontomologists, and containing erickets, grasshoppers, locusts, &c. The genus is now restricted to the true crickets—e.g. G. domesticus and G. eampestris, while the family Gryllide is defined to include a not very large number of related genera, such as the mole cricket (Gryllotalpa). See CRICKET, GRASSHOPPER, LOCUST.

Gryphius, Sebastian, a famous printer, born at Rontlingen, in Swabia, in 1493. He came as a youth to Lyous, and died there in 1556, having between 1528 and 1547 issued above 300 works, notable for their accuracy and the large clear type in which they were printed. Gryphius preferred a large bold Italie type. Amongst the more noted works are the fine Latin Bible of 1550, and Dolet's Commentaria Lingua Latina (1536). The original German spelling of the Latinised name Gryphius is Gryph, the French Gryphic. The well-known emblem on Gryphius's publications is a griffin Gryphius's sons, Antoine and François, were also famous French printers.

Gsell-Fels, Theodor, author of the excellent guide-books for Italy, was born at St Gall in 1819, and has laboured with equal success as a medical man in various towns (Würzburg, Berlin, Vienna, Zurieh, &c.) and as a lecturer on Italian art (chiefly at Basel). His thorough knowledge of Italy, its history and its art treasures, is brilliantly illustrated in his four guide-books to that country—'Oberitalien,' 'Mittelitalien,' 'Rom und die Campagna,' 'Unteritalien und Sizilien'—which are published as Meyer's Reisebücher. Gsell-Fels

has also published works on the baths and sanatona of Switzerland (2d ed. 1885), and Germany (1885), and edited a guide-book on South France.

Guacharo, or Oil-Bird (Steatornis caripensis), a remarkable South American bird, with characters which seem to unite it to owls and goatsuckers, but differing from the latter in having a strong bill, and being frugivorous. The food of the guacharo consists of hard and dry fruits. It is about the size of a common fowl; the plumage brownish-gray, with small black streaks and dots. The guacharo is a nocturnal bird, a circumstance very singular among



Guacharo (Steatornis caripensis).

fringivorous birds. It spends the day in deep and dark caverns, where great numbers congregate and make their nests. It was first known from Venezuela, but has since been discovered in Peru, Trinidad, and elsewhere in the northern South American region. Humboldt gives a most interesting account, in his Personal Narrative, of a visit to the great Guncharo Cavern in the valley of Caripe, near Cumana. This cavern is visited oneo a year for the sake of the fat of the young birds, which are slaughtered in great numbers, and their fat melted and stored for use as butter or oil. The clarified fat is half liquid, transparent, inodorous, and will keep for a year without becoming rancid.

Guaco. See Amstolochia.

Guadalajara, (1) an old and decayed town of Spain, capital of the province of the same name, on the Honarcs, 35 miles NE. of Madrid by rail, with some miniportant manufactures of ilannel and serge, and a royal college of engineering. Here is the quaint, neglected palace of the Mendozas, whose tombs, in the Panton below the chapel of San Francisco, were barbaronsly mutilated by the French. Pop. 8524.—The province occupies the northern part of New Castile (see Castile), and has an area of 4660 sq. m. Pop. (1878) 201,288; (1887) 207,300.—(2) Capital of the Mexican state of Jalisco, and the third city of the republic, lies in a fertile valley by the Rio Grande de Santiaga, here crossed by a fine bridge of 26 arches, 280 miles WNV. of Mexico city, with which the place is connected by rail. Though most of the houses are of only one story, the town presents a pleasing appearance, with wide streets crossing at right angles, numerous public squares, and a fine, shaded alameda; there are soveral lines of tramway, and water is supplied by an aqueduct over 20 miles long. Gnadalajara is the seat of an archbishop, and possessos a handsome cathedral, besides the government palace, a mint, university, hospitals, and school of art. Its industries are important: it is the chief seat of the cotton and woollen manufactures of the country; and the Gnadalajara

pottery and metal wares, like the confectionery, have a reputation all over Mexico. Pop. (1888)

Guadalaviar (anc. Turia), a river of eastern Spain, has its source near that of the Tagns, in the south-west of Aragon, and after a course of 190 miles, in a generally south-south-east direction, falls into the Mediterranean at Grao, 1½ mile below Valencia. In passing through the beantiful Hnerta de Valencia, it is divided, for purposes of irrigation, into numerous channels.

Gradalquivir (Arab. Widdi-ad-Kebir, 'the grent river;' anc. Butis), the most important river of Spain, and the only one that, fed by the rains in winter and the Sierra Nevada's melting snows in summer, presents at all seasons a full stream. It rises in the Sierra de Cazorla, in the east of the province of Jaen, flows in a general south-west direction through the provinces of Jaen, Cordova, Seville, and, forming the boundary for about 10 miles between the provinces of Huelva and Cadiz, falls into the Gulf of Cadiz at San Lucar de Barrameda, after a course of 374 miles. Strelbitsky estimates its drainage area at 21,580 sq. m. The principal towns on its banks are Cordova and Seville, to the last of which, about 80 miles above its mouth, the river is navigable for steamers. Below Seville it twice divides itself into two branches, forming two islands—the Isla Menor and the Isla Mayor. Its chief affinents are the Guadalinar and the Guadiato on the right. At Montoro it breaks through the outlying spurs of the central Sierra Morena in a series of rapids, but its lower course is sluggish and dreary in the extreme; the stream itself is turbid and muddy, and eats its way through an alluvial level given up to herds of cattle and to waterfowl. There are no villages in this district, which, though favourable to annual and vegetable life, is fatal to man, from the fever and ague caused by the nuncrous swamps. During the equinoctial rains the river rises sometimes 10 feet, and the country is yearly flouded as far up as Seville, to which point the tide is noticeable.

Guadalupe Hidalgo, 5 miles by tramway N. of Mexico city, is the chief place of pilgrimage, and its brick cathedral the richest in all Mexico; for here is preserved a miraculous picture of a brown Virgin, painted on a peasant's coarse cloak. The treaty which ended the war with the United States was signed here, 2d February 1848.

Guadeloupe, one of the Lesser Antilles in the West Indies, and the most important of those which belong to France, lies about 77 miles N. by W. of Martinique, and contains, including dependencies, 494 sq. m., with a pop. in 1885 of 182,866, mostly blacks and mulattoes. It is divided into Grande-Terre on the cast, and Basse-Terre or Guadelonpe proper on the west, by a strait of from 40 to 150 yards in width, which bears the name of Salt River, and is navigable only for vessels of very light tonnage. The nomenclature of the two islands appears envirously perverso, for Basse-Terre is the loftier of the two, and Grande-Terre is now generally applied sololy to the capital (pop. 7600), a town of officials mainly, in the sonth-west of the island. Grande-Terre, generally low, is of coral formation; Basse-Terre, on the contrary, is traversed by volcanic mountains, which culminate in La Soufrière (the 'Sulphur Mine') at a height of 5497 feet. Earthquakes are frequent, and in the towns the houses are now built of wood or iron. The chief product of the island is sugar; coffee also is exported. The annual comnerce, including imports and exports (about equal) exceeds

£2,000,000; more than half of this trade is with France. Point-h-Pitre (q.v.) is the principal town and port; Le Moule, on the eastern coast of Grande-Terre, has 8500 inhabitants, and Grand-Bourg, on Marie-Galante, 7300. The colony is administered by a governor, assisted by a general conneil; primary education is free and compulsory, and there is a good tycce at Point-h-Pitre. The dependencies of Guadeloupe are the neighbouring islets of Désirade, Marie-Galante, and Les Saintes, besides St-Barthélemy and part of St-Martin to the north-west. Guadeloupe was discovered by Colmulus in 1493, but it was not till 1635 that it was colonised by the French; and after repeatedly falling into the hands of England, during her was with France, it was at length permanently ceded to the latter power in 1816.

Guadiana (Arab. Wadi Ana, the anc. Anas), one of the five principal rivers of the Iberian peninsula, formerly regarded as rising in the desert Campo de Montiel, where a stream which drains the small Lagunas de Ruidera flows northwest and disappears within a few miles of the Zancara. It was long believed that this stream reappeared in a number of springs and lakes that rise some 22 miles to the sonth-west, known as the Ojos ('Eyes') of the Guadiana, and connected by a small stream with the Zancara; but it has now been ascertained that the waters which disappear higher up find a short underground way to the Zancara, which is therefore the true Upper Guadiana. Itsing in the east of the plateau of La Mancha, it flows at first south and west to the Ojos, below which point it receives the name of the Guadiana. It follows a sinnous westerly course as far as Badajoz, then bends southward, forms for some miles the boundary between Spain and Portugal, and flows through part of the province of Alentejo, returning to form the frontier again, until it empties in length, luft is navigable only for about 42 miles. Its chief affluents are the Jahalon, Zujar, Matachel, Ardila, and Chanza, all on the left.

Guaiacum, a genus of trees of the natural order Zygophyllacer, natives of the tropical parts of America. The flowers have a 5-partite calyx, five petals, ten staniens, and a tapering style; the fruit is a capsule, 5-angled and 5-celled, or the cells by abortion fewer, one seed in each cell. The trees of this genus are remarkable for the hardness and heaviness of their wood, known variously as and nearness of their wood, known variously as Lignum Vita, as Guaiacum-wood, and as Brazilwood; as well as for their peculiar resinous product, Guaiacum, often but incorrectly called a gam. The species to which the commercial Lignum Vitae and Guaiaeum are commonly referred is G. officinale, a native of some of the West India islands, and of some of the continental parts of America; a tree 30 or 40 feet high, leaves abruptly pinnate, with two or three pairs of ovate, obtuse, and perfectly smooth leaflets, pale blue flowers in small clusters, which are succeeded by compressed roundish berries, a farrowed bark, and generally a crooked stem and knotty branches. It seems probablo, however, that other species, as well as this, supply part of the guaiacum-wood and resin of commerce. At present they are obtained chiefly from Cuba, Jamaica, and St Domingo. The wood is imported in hillets about 3 feet long and 1 foot in diameter, of a greenish-brown colour. This is the colour of the heart-wood; the sap-wood is pale yellow. Guaiaenm-wood is remarkable for the direction of its fibres, each layer of which crosses the preceding diagonally; aunual rings are scarcely to be observed, and the pith is extremely small. It sinks in water. It is much valued, and used for many purposes, eliefly by turners; ships' blocks,

rnlers, pestles, and bowls (see Bawls) are among the articles most commonly made of it. When rubbed or heated, it emits a faint disagreeable aromatic smell; its taste is also pangent and aromatic. Shavings and raspings of the wood are bought by apothecaries for medicinal use. The bark is also used in medicine on the continent of Europe, although not in Britain. The virtues of both wood and bark depend chiefly on the resin which they contain, and which is itself used in powder, pill, and tincture. It is an acrid stimulant, and has been employed with advantage in chronic rheumatism, in chronic skin discases, in certain cases of scanty and painful menstruation (and hence it is occasionally an effectual remedy in cases of sterility), and in chronic catarrh. It has also been highly praised as a preventive of gont. The resin is an ingredient of the well-known Plummer's Pills. In the 16th and 17th centuries Gnaiacum was the remedy most in repute for syphilis. It is used in testing Blood-stains (q.v.). The resin sometimes flows spontaneously from the stem of the Guaiacum tree; it is sometimes obtained artificially. It is of a greenish-brown colour, and has a brilliant resinous fracture.



Gualacum officinale.

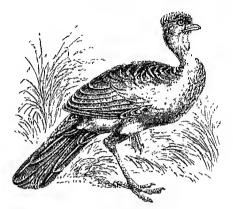
It has scarcely any taste, but leaves a hurning sensation in the mouth. One of its most striking characteristics is that it is coloured blue by its oxidising agents. It contains gratice with $HOC_{12}II_7O_6$, which closely rescubbles henzoic acid, and yields, on distillation, certain definite compounds known as gratiatin, pyrogratiatin, and hydride of gratically.

Guaira, LA, the port of Carácas (q.v.), on a narrow, shadeless strip of land between the monutains and the Caribbean Sea. Efforts have been made to improve the harbour by the construction of a breakwater and wharves. The average value of the imports is almost £1,000,000, and that of the exports nearly as much. Pop. (1887), with two neighbouring villages, 15,293. La Guaira is often referred to in Kingsley's Westward Ho!

Gualeguay, a town of Entre Rios, Argentine Republic, on the Gualeguay River, which flows into a tributary of the Parana: there is a railway (7 miles) to Puerto Ruiz at its mouth. The town has a tannery, steam-mills, and large slaughter-hones and beef-salting establishments. Pop. 11,000.

Gualeguaychú, a town of Entre Rios, Argentine Republic, on the Gualeguaychú River, which enters the Urugnay 11 miles below. Besides slaughtering and salting works, it has an extract-of-beef factory. Pop. 14,000.

Guan, or Yacou (Penclope), a genus of large game-birds (Gallinge) of the family Cracida,



Guan (Penelope cristata).

among the representatives in the New World of the grouse and pheasants in the Old. It is represented by fourteen species distributed from southern Texas through Mexico to Paragnay. The guans are graceful birds, with long tails, handsome, variegated plumage, bare, dilatable patches of skin on the throat, and naked spaces round the eyes. They live mostly on trees, descending to the ground in search of their food, which consists of fruits, berries, and insects. They are remarkable for their loud, frequent cries, from which the Spaniards call them squalling pheasants. Their flesh is much esteemed, and they fall a constant and easy prey to the lumter.

Guanabacóa, a town of Cuba, lying in a small fertile plain among rocky hills, 5 miles E, of Havana. It has two barracks and a military hospital. The population is officially returned at nearly 30,000.

Guanaco. See Huanaco.

Guanajuato, an inland state of Mexico, with an area of 12,500 sq. m., and a pop. in 1888 of 1,007,116. The greater part of the surface belongs to the lofty plateau of Anahmae (q.v.), and is traversed by the Sierra de (forda in the north, and the sierra de (forda in the south-west portion belongs to the fertile plain of Bajio. The riches of Guanajuato consist chiefly in its valuable mineral products; there are large numbers of gold, silver, lead, copper, and quick-silver mines still worked. Stock-raising is of some importance, but agriculture is little pursued, although the soil yields most products of both the temperate and tropical zones; a notoworthy article of export is chillies (see Carsicum). Large cotton and woollen factories have been established by foreigners.—Guanajuato, the capital, is curiously situated on both sides of a deep ravine, traversed by a mountain-stream that in the rainy season is swelled to a foaming torrent. The streets are steep and tortuous, the houses frequently of four or even five stories. The public buildings include a large government palace, a mint, barracks, a cathedral, several convents and colleges, an art-school, and the Albondiga, a public granary. The electric light and telephones have been introduced. Surrounded by a district honeycombed with mines, Granajuato presents mainly the appearance of a mining-town; its handsomest private houses belong to the wealthy proprietors of mines, and it contains several analgamation works, others lining the cañon for several miles. There

are also blanket factories and cotton-printing works. Pop. 52,112.

Guanare, capital of the state of Zamora, in Venezuela, stands on a river of the same name, and has a pop. of 10,390.

Gnanches, the aborigines of the Canary Islands (q.v.).

Guanin is a yellowish white, amorphous substance, which derives its name from its being a constituent of guana; but it also forms the chief constituent of the excrement of spiders, has been found attached to the scales of fishesbleak, for example-and seems to be a normal constituent of the mammalian liver and pancreas. With regard to its occurrence in guano, as it has not been found in the recent exercise that it is birds, there is every reason to believe that it is formed by slow oxidation (from atmospheric action) of the uric acid, much as uric acid can be made to yield urea and oxalic acid. And in the pancreas yield urea and oxalic acid. And in the pancreas and liver it probably represents one of those transitory stages of disintegrated nitrogenous tissue which are finally excreted by the kidneys in the more highly oxidised form of urea. Gnamin is a diacid base, but also forms salts with metals, and combines with salts. When heated with hydrochloric acid and potassium chlorate, it is oxidised to carbon dioxide, gnanidin, and parabanic acid. to carbon dioxide, guanidin, and parabanic acid.

Guano (derived from the Peruvian word huano. 'dung') is the excrementations deposit of certain sea-fowl, which was found in immense quantities on certain coasts and islands where the climate is dry and free from rain. Although the use of gnano as a manure is comparatively recent in Britain and in Europe, its value in agriculture was well known to the Peruvians long before the coming of the Spaniards. Alexander von Humbaldt first brought specimens of guano to Europo in 1804, and sent them to Fouroroy, Vauquelin, and Klaproth, the best analytical chemists of the day.

The commercial value of guano depends almost entirely upon the amount of decomposition to which

it has been subjected by the action of the atmosphere, the value consisting as it does essentially of nitrogenous and phosphatic compounds, the former being chiefly animonia salts derived from the decomposition of the uric acid and urates which exist in the fresh excrement. The ammoniacal portion of these deposits, and some of the phosphates, are tolerably soluble in water, and are readily washed away by rain. There are these classes of guanos: (1) those which have suffered little by atmospheric action, and which retain nearly the whole of their original constituents, such as the Angamos and Peruvian gnanos; (2) those which have lost a considerable portion of their soluble constituents, but remain rich in their less soluble constituentsthe phosphates of lime and magnesia, such as the Ichaboe, Bolivian, and Chilian guanos; (3) those which have lost nearly all their ammonia, and conwhich have lost nearly all their animonia, and contain but little more than the earthy phosphates of the animal deposit—many being further largely contaminated with sand. In the last class must be placed the various African guanos (excepting that from Ichaboe), West Indian guano, Kuria Muria (islands off the coast of Arabia) guano, Sombrero guano, Patagonian guano, Shark's Bay guano (from Anatralia). Australia), &c.
Most of the so-called Peruvian guano has been

obtained from the Chincha Islands off the coast of Pern. The following table represents the mean of

78 samples of Peruvian guanos:

Moisture Organic matter and salts of ammonia. Earthy phosphates. Alkaline salts containing 3 34 phosphoric acid, and equal to 0.89 soluble phosphate of line	
Sand, &c	1.83
	100 00
Animonia per cent	10:52

The following table gives the mean of several analyses of the inferior kinds of guano, the first four belonging to the second class and the remaining three to the third class:

	Ichalme,	Ichalioe,	Chillan.	Bollvian.	Patagonian,	Kuria Murla.	Saldanha Bay.
Moisture Organic matters and salts of animoma, Earthy phosphates Alkaline salts	11fere 11 goes, 27:3 34:3 50:3 5:0	20·0 24·4 20·4 6·2	20·4 18·6 31·0 7·3	10·1 21·0 51·5 14·1	25 0 18 3 44 0 2 1	18·1 12·4 42·7 4.2	20°0 14°9 50°4 5°8
Carbonate of lune	31	20.0	22.7	27	10.6	4 1 18·5	2.0
	100.0	100 0	100.0	100 0	100 0	100 0	100.0
Ammonia, per cent	7:3	6.0	5.47	4'ō	2.2	2.05	1.47

The nitrogen in these analyses is calculated as ammonia for the purpose of comparison. In reality it exists in various forms of combination—viz as uric acid, urca occasionally, urate, oxalate, hydrochlorate, phosphate, &c., of ammonia, other urates, Guanin (q.v.), and undefined nitrogenous compounds. Hence, as may be inferred, a complete analysis of guano is a work of very considerable labour; but, as its agricultural value depends mainly on the quantities of annonia, soluble and insoluble phosphates, and alkaline salts which it contains, such analyses as those we have given are sufficient for practical purposes, and they are easily made.

If the value of a manure be calculated, as is done by Boussingault and other chemists, according to the amount of nitrogen which it contains, one ton of good Peruvian guano is equal to 33½ tons of farmyard manure, 20 tons of horse-dung, 38½ tons of cow-dung, 22½ tons of pig-dung, or 14½ tons of human excrement.

The introduction of guano into Britain as a manure is comparatively recent. In 1840 only 20 casks of it were imported. In 1841 Lord Derby

spoke strongly in its recommendation at a meeting of the Agricultural Society; and from that time it came rapidly into use. In 1850 the import was 116,925 tons; in 1870, 280,311 tons; but in 1880 it had fallen to 80,497 tons; and from 1885 to 1888 it had still further decreased from 25,000 to 17,000 tons. Its value as a fertiliser has been so much appreciated, and its use so extensive, that it is gradually going out of the market owing to the diminution of supplies, its place being taken by various artificial substitutes (see Manure). See J. C. Neshit's pamphlet, History and Properties of Natural Guanos (new ed. 1860). FISH-GUANO. The organic fertiliser commonly

known as Fish-guano may be shortly defined as fish dried and ground to powder. The value of fish as a fertiliser is universally admitted, and is evidenced by the eageness shown by farmers, who reside in districts where fish can be easily and cheaply obtained, in acquiring and applying it to their land. Mussels, five-fingers or starfish, her-rings, and particularly sprats may be instanced as the fish most generally used in this way. The inconvenience and expense arising from this mode

of application to the soil, on account of the bulky as well as the unpleasant nature of the material, is obvious, the non-fertilising moisture alone amounting to between 60 and 80 per cent., and by so unchenhancing the cost of general haulage. The desirability of converting raw fish into a concentrated and portable powder comparatively free from moisture was first practically realised only shortly before 1862 by M. Rohart, whose product was obtained from the refuse of the Norwegian eedfisheries by drying the heads and backbones of the codfish upon heated floors after they had been sun-dried on the rocks, and subsequently grinding them between millstones to a floury powder.

Of late years fish-gnano has grown rapidly in favour among agriculturists, a preference based doubtless upon its merits as a fertiliser, and probably also due to its similarity both as regards origin, analysis, and effect to Peruvian gnano. The supplies of Peruvian gnano, as is now generally known, are practically exhausted, the imports into the United Kingdom having fallen from about 300,000 tons per annum in years gone by to about 17,000 tons in 1888. Not only in quantity is Peruvian gnano deteriorating, but also in quality, the ammonia, for example, found by Veeleker in 1864 being 18 62, whereas in 1889 the very best shows only 9 50, and others vary from 6 50 per cent down

to as low as 3 per cent.

In some quarters nitrate of soda has been named as the probable substitute for Peruviau gaano; lint, although its supplies are at present enormous, the character, composition, and action upon the soil are entirely different, one being of a mineral and the other of an organic origin. Fish gaano may be held to contain the fish with its natural properties of nitrogen and phosphoric acid in full; while Peruvian guano, which is the accumulation during ages of the excrement of birds whose main food has been fish, must have suffered by the action upon the fish of the digestive organs of the birds, as well as the effect of the weather upon the deposits. Fish guano may therefore he considered as the best substitute for the failing supplies of Peruvian guano. Another advantage is the fact that the available supplies of fish in Norway, Canada, Newfoundland, and elsewhere are practically inexhaustible. Fishguano, according to the fish from which it is made, analyses from 9 to 14 per cent. of aumonia, and from 13 to 32 per cent. of phosphate of lime. At the present time the selling price per ten is fixed, as regards the ammonia it contains, by the rading market price per unit of that ingredient in nitrate of soda, and, as regards the phosphate of lime, by the price of bone and Calcutta bone-meal. The market value of fish-guano varies, according to the analyses, from about £6 to £8 per ten weight. One ton of fish-guano is said to be equal in chemical effect to seventeen times its weight in farmyard manure.

Of the most generally known fish-guano there may be said to be four kinds. There is the 'raw' guano made in Christiansund and the Lofodens, upon M. Rohart's principle, which is used principally in Gernauy. There is also a guano made in London, Hull, and elsewhere, from fish which has been condemned by the authorities as unfit for human food. This description, naturally, embraces fish of all kinds and sizes, its great drawback being the large quantity of oil left in the gnano, the presence of which element is prejudicial to any fertiliser. By far the largest quantity of fish-guano is manufactured in various parts of Norway, but principally at Brettesnoes, in the Lofodens, by Jensen & Co., who make as much as 5000 tens per annum. This guano is made from the heads and backs of the codfish, and also from the heads and backs of the codfish, and also

is artificially dried and ground, much time being saved by this process, instead of waiting some months until the hones were sufficiently dried by the snn. To make 1000 tons of cod-guano 7,000,000 heads are necessary, and to obtain these 50,000 tons weight of fish have to be caught. The oil found in this guano is practically uil. The 'herring-guano' is obtained by extracting the oil and moisture by means of pressure from the herrings; the 'cake' thus obtained is then ground in the ordinary way by means of disintegrators, the result being a fine powder of high manurial value. Guano obtained from the cod analyses about 10 per cent. of ammonia and 30 per cent. phosphates, the latter high figure being due to the large predominance of bone over fleshy or nitrogenous matter. The contrary is the case in the herring-guano, in which the fleshy matter is very much greater than the bony substance, the analysis being about 13 per cent. each of ammonia and phosphate. Guano is also made in Canada and elsewhere from lobster and crab shells, and this is stated to be a valuable manure for garden purposes. The annual production of fish-guano is estimated at the present time at 15,000 tons, including that made in England, Seotian, And the United States of America. For Rock-guano, see Apatitie.

Guaporé, a navigable river of South America, rises in Brazil, and for some distance forms the boundary between Bolivia and Brazil. It unites with the Mannere to form the Madeira (q.v.).

Guarana, from the seeds of a plant belonging to the genus Paullinia (natural order Sapindacere), from whose seeds Guarana Bread, a kind of food, is prepared by the Guaranis and other savages of Brazil. P. sorbilis is the species which yields the paste called Guarana bread. It is made in round or oldong cakes, which are regarded in all parts of Brazil as very efficacions in the cure of many disorders, and which contain, hestdes other substances, some of them untritions, a considerable quantity of a substance supposed to be identical with theine or caffeine. It has been used medically in the United States and Europe. The Brazilians pound the Guarana bread, sometimes called 'Brazilian cocoa,' in water, sweeten it, and use it as a stomachic and febrifuge. It is also reputed appredisiae.—The genus Paullinia contains several species romarkable for their extremely poisonous properties. In the bark, leaves, and fruit of P. pinnata abounds a principle which slowly but surely causes death, and is employed for that purpose by the Brazilians; the dangerous Lechequana honey is obtained from P. australis; and from P. cupana, a native of the banks of the Orinoco, an intoxicating drink is procured.

Guarantee Associations, joint-stock companies on the insurance principle, which become security for the integrity of cashiers, travellers, and other employees, on payment of an annual sun calculated either upon the salary or upon the amount for which the association holds itself liable. The advantage of the system is that it obviates the necessity of requesting private friends to become sureties. See Guaranty, and Caution.

Guaranty, or Guarantee, is a contract by which one person binds himself to my a debt or do some act in case of the fullure of some other person, whose debt or duty it is, to do the thing guaranteed. The person so hinding himself is generally called the surety in England, while the person who is primarily liable is called the principal. Thus, where A borrows money, and B joins as a party in a bill of exchange or a bond to scenre the loan, B is a surety. Where B guarantees that cortain goods which are supplied to A shall be paid for, he is

more usually styled a gnarantor than a surety, but

the liability is the same.

Such a contract must be in writing, for the Statute of Frands (29 Charles II. chap. 3) required that no action should be brought whereby to charge the defendant upon any special promise to answer for the debt, default, or miscarriage of another person, unless the agreement or some memorandum or note thereof should be in writing and signed by the party to be charged therewith, or some other person by him lawfully anthorised. So that a surety can only be bound by some writing signed by himself or his agent. And Lord Tenterden's Act (9 Geo. IV. chap. 14, sect. 6) cnacted the same thing as to persons making representa-tions as to the character, ability, or dealings of another, with intent that the latter may obtain In order to bind the surety, there must also be no deceit or misrepresentation used as to the nature of the risk or as to the state of the accounts. If a guaranty is given to a firm, it is not binding after a change in the firm, unless the parties expressly stipulate to the contrary. If the creditor discharges the principal, or even gives time, by way of indulgence to him, the surety is released, for he is thereby put to a disadvantage. In general, the creditor can sue citier the principal or the surety for the debt at his option. If the surety is obliged to pay the debt of his principal, he can sue the principal for the money so paid, and is entitled to have all the securities assigned to him, so as to enable him to do so more effectually. If one of two or him to do so more effectually. If one of two or more sureties is made liable for the whole debt, he may call upon his co-sureties to contribute equally with himself. For the Scotch law, see Caution.

Guardafui, Cape, the most eastern point of the African continent, and the extremity of an immense promoutory (the Somali country) stretching seaward in an east-north-east direction, and washed on the north-west by the Gulf of Aden and on the south-east by the Indian Ocean. The eape is in 11° 50′ N. lat. and 51° 14′ E. long.

Guardian, in English law, is the legal representative and enstudier of infants—i.e. persons under the age of twenty-one. The fendal law of guardianship was very elaborate; but its provisious have not been of practical importance since the abolition of the Court of Wards in 1641. Under the modern law, a father may, by deed or will, appoint guardians for his clild. Parents themselves are called guardians by nature or for nurture; a father has the custody and control of his children, at least until they attain the age of fourteen; and this right passes at his death to the mother, either alone or jointly with any guardian whom he may have appointed. The courts appoint guardians when necessary; thus a guardian ad litem is appointed to defend an action brought against an infant; and if an infant is unale executor a guardian; and if an infant is unale executor a guardian is appointed to administer during his minority. If the infant is old enough to do so, he is sometimes permitted to choose his guardian. A guardian is in a fiduciary position, and his powers are usually exercised under control of the court. For his powers in regard to the infant's marriage, see INFANT.

The guardian of a lunatie is usually called

The guardian of a lunatie is usually called a committee. In Scotland the word 'guardian' is sometimes used in reference to lunatics, but scldom applied, except in a popular sense, to those who have the custody and care of children. In corresponding cases in Scotland the enstody of a child under twelve, if female, or fourteen, if male, helongs to her or his tntor; and from those ages to twenty-one the child has no legal guardian, being sui juris, but the care of the child's property helongs to a Curator. For guardians of the poor,

see Poor Laws.

Guardian Augels. See Angel.

Guards are in all armies the élite of the troops, and form the sovereign's bodygnard. In the British service the Gnards compose what is called the Household Brigade, and include the 1st and 2d Life Guards, the Royal House Gnards (see Cuirassiers), the Grenadier Guards (three battalions), Coldstream Guards (two battalions), and Scots Guards, formerly Scots Fusiliers (two battalions), or about 1300 cavalry and 6000 infantry. Before the abolition of purchase, the officers of the Foot Gnards held higher army rank than that they bore regimentally—i.e. ensigns ranked with licutenants of other regiments, lieutenants with captains, captains with lieutenant-colonels; and by exchanging into the line they were enabled to take rank above officers of much longer service. When purchase was abolished in 1871, it was decided that officers joining the Guards after that date should not hold this exceptional rank. The brilliant services of the Fiench Guard in the Napoleonic wars are well known. See also the articles National Guard, Scots Guards, Swiss Guards.

Guardship is a term used in two senses. In the first place it is applied to a guardship of reserve, which is practically a depôt ship for men employed in vessels of the royal navy out of commission; and of these there are only three, stationed at Sheerness, Portsmonth, and Plymonth. In the second place the term is applied to vessels of the royal navy which are stationed at other ports on the coast; they are the headquarters of the different coastguard districts, and are kept manned with reduced crews; they can complete their crews at any time from the men in the coastguard, and so manned can proceed to sea at once as a fighting squadrom, and, indeed, are supposed to be in the English Channel ready for action in four days after a mobilisation order is issued. The Royal Naval Reserve in some cases do their drill on board these ships, which, however, are in no sense guard (i.e. defence) ships for the particular ports at which they are stationed.

Guarca, a genns of tropical American trees of the natural order Meliaceae, of some of which the bark is used as an emetic and purgative. G. grandifolia is called Musk-wood in some of the islands of the West Indies, the bark smelling so strongly of musk that it may be used as a perfume. Although the tree attains timber size and has been employed for making rum hogsheads when other material was scarce, the wood contains a bitter resinous substance, the flavour and smell of which is communicated to the spirits to their detriment.

Guarini, Giovanni Battista, poet, was born at Ferrara, 10th December 1537, studied at Pisa, Padua, and Ferrara, and was appointed to a chair at Ferrara. At the age of thirty he accepted service at the court of Ferrara, and was entrusted by Duke Alfonso II. with various diplomatic missions to the pope, the emperor, Venice, and Poland. He died in 1612 at Venice. As a poet, he is remarkable for refined grace of language and sweetness of sentiment, while his defects are occasional artificiality, a too constant recurrence of antithetical imagery, and an affected dallying with his ideas. His chief and most popular work, Il Pastor Fido ('The Faithful Swain'), obtained a high measure of popularity on its appearance, and passed through forty editions in the author's lifetime, though it is really an imitation of Tasso's Aminta. An (incomplete) edition of Guarini's varied writings, including sonnets, comedies, satires, and political treatises, was published at Verona in 1737 (4 vols.). See the monograph by Rossi (Turin, 1886).

Guarino (Lat. Varinus), a learned Italian, born at Verona in 1370, went to Constantinople in 1388 to learn Greek under Chrysoloras. After his return, he taught in Verona, Padua, and Bologna, was tutor to Prince Lionella of Ferrara, acted as interpreter at the Conneil of Ferrara, and died in 1460. He performed great services for the revival of elassical studies; wrote Greek and Latin grammats; translated parts of Strabo and Pintarch; and helped to establish the text of Livy, Plautus, Catallus, and Pliny. See monographs by Rosmini (1806) and Sabbadini (1885).

Guarnieri, or Guarneri, the name of one of the three celebrated families of violin-makers who flourished at Cremona in the 17th and 18th centuries. The most notable of the family were Andrea (fl. 1650-95), a pupil of Niccolo Amati; his sons Giuseppe (fl. 1690-1730) and Pietro (fl. 1690-1725); and his nephew Giuseppe, commonly called Ginseppe del Gesà, who flourished 1725-45, and whose violins were not inferior to those of the Stradiyan.

Guastalla, a small town of Italy, on the Po, 19 miles by tail NE. of Parma. The scat of a bishop (since 1828), it has an old eastle, and a school of nunsic. Guastalla gave name in 1406 to a countship, in 1621 to a duchy. Pop. 2648.

Gnatemala, a republic of Control America, lying between 13° 46′ and 17° 44′ N. lat., and bounded on the W. and N. by Mexico; on the E. by Belize, the Gulf of Hondmas, and the republic of Hondmas; on the S. and W. by San Salvador and the Pacific. Part of the frontier, however, is not yet, fixed the hammany live teament. Years and the Pacific. Part of the frontier, however, is not yet fixed, the boundary line towards Yncatau in particular being still undetermined. In the absence of government surveys the area is estimated at some 48,600 sq. m. much of which is wholly nnexplored, so that the course of even the larger rivers and the direction of the main mountainchains, as laid down in the maps of the country, are to a considerable extent hypothetical. The greater part of Guatemala is mountainous, the high-lands having a mean elevation of about 7000 feet above the sea; but the surface presents groat variety, with extensive plateaus, terraces, and upland valleys—the last notable for their beauty, fertility, and favourable climate. The main chain runs generally parallol with the Pacific coast, which it approaches within fifty miles; on this side the slope is steep and broken by many volcances, while towards the Atlantic it sinks in gentle incline, with subsidiary ranges extending to the water's edge. Of the volcances several are active; the most noted is Fuego (12,075 feet), which lays claim to nearly half of the recorded emptions in Central America. Agna, from whose crater-lake a are to a considerable extent hypothetical. Central America. Agna, from whose crater-lake a delnge of water destroyed the first capital in 1541, has been extinct for centuries. Earthquakes are frequent, and occasionally (as in 1863 and 1874) very frequent, and occasionally (as in 1863 and 1874) very severe; sulphur and other hot springs are numerous. Gratenuals is well watered, the principal rivers being the Usunacinta, which flows into Campeachy Bay, and the Polochic and Motagna (about 280 miles), which full into the Gulf of Honduras; yet, owing to the configuration of the country, water in many parts is scarce in the dry season. Those of the streams, moreover, that are navigable possess the ever-present bar common to Central American rivors. The lakes include the Lago de Izabal (36 miles long), below which the Polochic becomes the Rio Dulce; the Laguna del Peten (27 miles by 15); and the Lagos de Atitlan (17 by 8) and Amatitlan (9 by 3).

The climate, except in the low-lying districts, may

The climate, except in the low-lying districts, may be described as perpetual spring, and is generally healthy, but the people are for the most part utterly regardless of all sanitary laws. The hot coast-lands on the Pacific are especially liable to visitations of yellow fever. At the capital the temperature ranges

from 40° to 87° F., and the annual rainfall is about 53 inches; in the lowlands the mean range is from 70° to 90°; in the uplands ice appears in the dry winters. The rainy season extends generally from April to October, April and May being the hottest months.

Guatemala is as yet of little importance as a mining country, but chiefly because its resources are almost wholly undeveloped. Gold, which is found in most of the river beds, is worked to some extent in the department of Izabal; some silver mines are also worked, and a mint was established mines are also worked, and a mint was established in 1888; and salt and saltpetie are mined, though not in large quantities. Other minerals are lead, iron, copper, coal, quicksilver, marble, porphyry, snlphur, zine, gypsum, &c. But the wealth of the country consists in its rich soil, which, according to the altitude, yields the products of every zone. The shores are lined with mangroves, the rivers with bamboos, beyond which rise the forests, where the malogany, the cocoa-mut, colume, and other palms tower above the wild bananas, ferns, and gingers that scantily cover the bare soil below, whilst the exuberance of orchids and trailing para-sites confuses the identity of the trees. In the only are forests of lingo pines and spruces and only, agaves and cherimoyas appoar on the hillside, and thick grass elothes the ground; even in the dry lava plains a coarse grass springs up between the lava blocks, and acacias and calabash trees are met with. The forests contain over a lundred kinds of timber trees, including many of the most valuable; yet, owing to the absence of roads and means of transport, Chatemala is obliged to import a large quantity of Californian red-weed and other timber. In 1888 the appointment of transport, that we are a supported to the project of the policies of the policies of the policies. keepers of the national forests was ordered. Maize and hariest beans (frijoles) grow freely everywhere, pens and potatoes in sufficient quantity for consumption, wheat in the uplands, and rice in the bottom-lands. Other products are collee (the chief export), sugar, eacao, india-rubber, tobacco, cotton, pita and sisal hemp, saisaparilla, and many medicinal plants, bananas, and a number of other fruits, mostly of the finest quality. The export of cochineal, formerly of chief importance, has almost ceased. Cattle are raised sufficient for the needs of the country, though not, as in Houdwas, for exportation. The fauna of Guatemala includes the jaguar, punta, ocolot, coyote, red-deer, tapir, peccary, armadillo, and several monkeys; ignanas and turtles are numerous, whereas the alligators are small and not frequent, and bons and venomous snakes, though the number of species is considerable, are seldom met with. The birds are of great variety and beanty, comprising several lumdred species; the national omblem is the superbly coloured Quetzal (q.v.). Insects abound, the most species; the national omblem is the superbly coloured Quetzal (q.v.). Insects abound, the most notable being the brilliant butterflies, immense beetles, locusts, many kinds of ants, scorpious, tarantulas, grasshoppers, mosquitoes, flies, and

ijageis.

The industries of Guatemala are chiefly confined to the manufacture of woven fabries, pottery, and saddlery; there are several chocolate factories, and flour and saw mills in the country, and numerous distilleries of the fiery uquardient, the sale of which is a government monopoly, yielding about a fouth of the annual revenue. San José, the chief port, Champerico, and Ocos, all on the Pacific, are merely open readsteads, provided with iron piers; but Santo Tomás, on the Atlantie side, has a good harbour; and in 1883 Livingston, at the month of the Rio Dulee, was proclaimed a free port for ten years, since when the trade has considerably increased. The development of the country, however, is greatly hampered by the absence of serviceable reads, which are for the most part represented

by rough mulc-tracks. For the five years ending 1888, the average annual imports amounted to 4,171,332 dollars, the average annual exports to 6,801,275 dollars. The imports, of which Britain supplies nearly a third and the United States a sixth, are chiefly specie, cotton, woollen, and silk goods, wines and spirits, railway plant, and flour; the principal exports are coffee, sugar, fruits, and hides.

About a third of the people are said to be of European descent, and the rest aborigines (Maya-(luichés); but this rough division takes no account of the mixed races, which embrace nearly a score of distinct crosses recognised by separate names; these Ladinos greatly outnumber the comparatively few pure descendants of the Spanish invaders or settlers. The Indians of the northern forest-country are wild and uncivilised. A census taken in 1880 returned the population at 1,224,602; in 1889 this was calculated to have increased to 1,427,116. The capital, Gnatemala la Nueva, in 1839 had 65,796 inhabitants, Quetzaltenango 20,000, Climaltenango and Antigua Guatemala about 14,000. The state religion is the Roman Catholic, which is maetically the only form in use, although others are allowed by the constitution. But many of the fine old churches of the country are crimbling to min: and it is said that scarcely a tenth of the population ever enter those that remain in use. About a fourth of the births are illegitimate, the larger proportion occurring among the whites. Since 1879 primary education has been compulsory and gratuitons. There are now about a thousand primary schools of all kinds, attended by some 50,000 pupils; excellent high schools for boys are found in the capital, Quetzaltenango, and Chiquimula, and for girls in the capital and at Belen; and schools of law, medicine, engineering, philosophy, literature, and music are also provided.

Guatemala is divided into twenty-two departments, under civil governors. The executive is vested in a president, elected for six years by ever enter those that remain in use. About a

Gintemala is divided into twenty-two departments, under civil governors. The executive is vested in a president, elected for six years by direct popular vote; he appoints six secretaries of state, who with nine others form the council. The assembly is elected by universal suffrage, to the number of one for every 20,000 of the population. The standing army consists nominally of about 2500 men, the militia of nearly 65,000. This force is a heavy drain on the resources of the country, whose finances are not in a flourishing condition. Calculated at the average rate of 6½ dollars per pound sterling, in 1888 the revenue was £769,919, and the expenditure was estimated at £704,216; but the internal debt was retnined at (on the same calculation) £945,093, the floating debt at £359,745, and the foreign debt at £922,700—making a total of £2,227,538, including past interest. To meet the increase in the floating debt, which had grown up since 1887, in 1889 about a million dollars of paper money was put in circulation. On the other hand, since 1887 the interest on both the internal and the foreign debt has been punctually paid, and the bonds have risen greatly in value.

Guatemala was conquered in 1524 by Cortez' lieutenant, Alvarado, with every accompaniment of cruelty and oppression. After three centuries of harsh and greedy rule, under which the viceroyalty of Guatemala embraced all that is now known as Central America, independence was proclaimed, 15th September 1821. A confederation survived with difficulty from 1824 to 1839; it fell before the attacks of Rafael Carrera, an uncducated Indian of low birth, who founded the present republic, and reigned over it until his death in 1865. From 1871 until he was killed in a war with Salvador in 1885, General Barrios was president, and under his iron rule the country made considerable progress;

monastic orders were rigorously suppressed, and much of the church property was confiscated and appropriated to the uses of public education and for other purposes. There are at present only two short lines of railway (100 miles) in operation; a line from Puerto Barrios, on the Atlantic, to Gnatemala city, to connect the Atlantic with the Pacific, was commenced in 1884, but in the meantine has been ahandoned. In 1888 there were in the republic 157 post-offices, and over 2000 miles of telegraph.

The best work on Guatemala is Brigham's Guatemala, the Land of the Quetral (1887). See also Stephens, Incidents of Travel in Central America (New York, 1841); Dollfus and Montsenat, Voyage géologique dans les Républiques de Guatemala et de San Salvador (Paris, 1833); Boddam Whetham, Across Central America (Lond. 1877); Lafernière, De Paris à Guatemala (Paris, 1877); a paper by Mr A. P. Mandslay in Proc. Roy. Geog. Soc. (1883); Channay, Les Anciennes Villes du Noncau Monde (Paris, 1885); Stoll, Zur Ethnographie der Republik Guatemala (Zurich, 1884), and Guatemala, Reisen und Schilderungea (Leip. 1886); a very full report by Consular Reports' (1889); for the geography, Lemale, Guia geográfica (Guatemala, 1881); and for the carly Instory, Milla y Vidaurre, Historia de lu América Centrat (Guatemala, 2 vols, 1879).

Guatemala (Santiago de Guatemala; also Guatemala la Nueva), capital of the republic of Guatemala, and the largest and most important city of Central America, stands on a wide platean, really 4900 feet above sca-level, and 72 miles by rail NNE. of its port, San José. It is regularly built, with wide, roughly-paved streets running at right angles, and houses nearly all of one story; Indians. In the plaza the metropolitan cathedral towers above the government buildings, which include the large, one-story residence of the president. There are numerous other churches, several large hospitals, and the archbishop's palace. Education is cared for in the Instituto Nacional, with laboratories, a muscum, a zoological garden, and a good meteorological observatory; and in well-appointed schools of arts and design, agricultural and business colleges, normal schools, a polytechnic institute, and schools of law and medicine—all supported by government. Other public structures are two large general markets, a subsidised theatre, and a bull-ling. Tramways and the electric light have been introduced, and there are a score of public fountains and washing-places; but the water, brought 6 miles by an aqueduct, is not good. There are some manufactures and a considerable commerce, all the foreign trade of the republic heing concentrated here. Pop. (1889) 65,796.—The present city of Guatemala is the third capital of that name. The first, now called Giudud Viejo, lies on the plain between Fuego and Agua. It was founded by Alvarado in 1524, and destroyed in 1541 (see GUATEMALA). It has a population now of some 3000 Indians. The second there are a score of public fountains and washingpopulation now of some 3000 Indians. The second capital, Guatemala la Antigua (Old Guatemala), 21 miles NE. of the first and 21 miles WSW. of the 25 miles N.E. of the instant 21 miles wish. of the present capital, was one of the linest cities of America, with a hundred churches and 60,000 inhabitants; in 1773 it was for the second time destroyed by an earthquake, but among the noble ruins a new city has arisen, lit also with the electric light, and sheltering a population of at least 14,000.

Guaya (Psidium), a genus of trees and shrubs of the natural order Myrtaceæ, mostly natives of topical America, and some of them yielding fine and much-valued fruits. They have opposite entire, or almost entire leaves, a 3-5-lobed calyx, 4-5 petals, and a 1-5-celled herry with many-seeded cells.—The Common Guaya or White Guaya (P.

pyriferum) is a lew tree of 7-20 feet, with numerous branches, obtuse smooth leaves 2-3 inches long, and fragrant white flowers on solitary axillary stalks. It is said to be a native alike of the East

and

now

both.

was dneed

the Indies West.

much cultivated in

It is not improbahle,

how.

intro-

into Engt

from America, but it has now heeome fully

Indies, and is

ever, that it

naturalised;

it is to be seen in the

jungle a-round every

occasionally

อาดงงา กร ก

cottage Ceylon. has long been



Guava (Psidium nun iferum): a, section of fruit.

stove-plant in Britain. The fruit is larger than a stove-plant in britain. The fruit is alonger than a hen's egg, roundish or pear-shaped, smooth, yellow; the rind thin and brittle; the pulp firm, full of hony seeds, aromatic, and sweet. The jelly or preserve made from it is highly esteemed, and is now regularly imported into Britain from the West Indies and South America. The rind is stewed with milk, and is also made into marmalade. This fruit is rather againgrout then layer two. Charach hole beind with is alse unde into marmalade. This fruit is rather astringent than laxative. Guava buds, boiled with barley and liquorice, make a useful astringent drinkin diarrhoa.—The Red Guava (P. pomiferum), alse now cemmon in the East as well as in the West Indies, produces a beautiful fruit, with red flesh, but not nearly se agreeable as the white guava. It is very acid.—The China Guava (P. Cuttleianum), a native of China, produces fruit readily in vineries in Britain. It is a larger tree than the white guava. The fruit is round, about the size of a walnut, of a fine claret colour when ripe, growing in the axils of the leaves; the pulp ripe, growing in the axils of the leaves; the pulp purplish-red next the skin, becoming paler towards the centre, and there white, soft, subacid, in consistence and flavour resembling the strawherry. It makes an excellent preserve. It succeeds in the open air in the south of France.—On some of the open air in the south of France.—On some of the mountains of Brazil grows a dwarf species of Gnava, called Marangaha (P. pygnavan), a shruh, 1–2 feet high, with fruit about the size of a gooseberry, much sought after en account of its delicious flavour, which resembles that of the strawberry.—The Bastard Gnava of the West Indies is a species of Engagin (a. r.) Eugenia (q.v.),

Guaxaca. See Oaxaca.

Guayaquil, chief commercial city of Ecnador, and capital of Guayas province, lies in the fertile valley of the Guayas, some 30 miles above its month. From the river the town, with its pagoda-like towers, presents an imposing appearance, which is not burne out on closer inspection, and the climate is hot and unhealthy, yellow fever being very common. Most of the houses are built ef bamboo or wood and carth, and covered with creepers. The easton-house is the most noteworthy of the public buildings, which include a cathedral and a town-hall. The town, however, is now lit with gas, there is a complete system of transvays, and the streets are gradually being paved; while in 1888 considerable progress was made with much-needed

In 1889 a statue to Bolivar was erected. The leading manufacturing establishments are combined steam sawnills, foundries. and machine-shops; there are also ice-factories and a lager beer brewery; and the place is noted for its straw hats and hammocks. Ships drawing 18 feet ean come up to the breakwater, and below the town there is a wharf, with a dry-dock opposite. open as far as Chimbo (64 miles). Most of the trade is in the hands of foreigners; of 220 vessels (197,800 tons) that cleared the port in 1888, 109 (197,800 tons) that cleared the port in 1888, 109 (113,548 tons) were British. The annual exports average £1,300,000, of which cocoa represents nearly five-sixths; the other principal items are coffee, ivory-nuts, rubber, hides, and specie. About 7 per cent. is shipped to Britain, and 14 per cent. to the United States. The town was founded by Orellana in 1537, and removed to its present site in 1803. Pan about 30,000. The Bay of Grayanvilla. 1693. Pop. about 30,000. The Bay of Guayaquil is the only important hay on the west coast of South America north of Patagonia.

Guayas, a fertile coast province of Ecuador. with an area of about 9000 sq. m., and a pop. (1885) of 95,640. Its chief product is cocoa, of a very high quality. Capital, Guayaquil.

Gnaymas, a well-sheltered port of Mexico, on the Gulf of California, the terminus of the Sonora Railway (353 miles by rail S. by W. of Benson, an Arizona station on the Southern Pacific Railroad). It is a small place, excessively hot, surrounded by barren mountains, and mostly inhabited by Indian lishermen; but already it exports precious metals, wheat, flour, &c. in considerable quantities, and its trade is increasing. Pop. 5000.

Gnayra. See GUAIRA.

Gubbins, a half-savage race in Devon, are mentioned by the pastoral poet, William Browne, in 1644, in a poem on Lydford Law, printed in Westcote's Devon. He says:

This town's enclosed with describ moors, But where no hear nor flou roars,
And nought can live but trops;
For all electronical by Nesh's Flood,
Of fourscore miles searce one foot's good,
And hills are wholly bogs.

And near hereto's the Gubbins Cave;
A people that no knowledge have
Of law, of God, or men;
Whom Gesar never yet subdued;
Who've lawless lived; of manners rude,
All savage in their den.

By whom, it any pass that way, He dares not the least time to stay, For presently they how!; Upon which signal they do muster Their naked forces in a cluster, Led forth by Roger Rowle.

Old Fuller says of this district: 'Gubbin's Land is a Scythia within England, and they pure heathers therein. . . Their language is the drosse of the dregs of the volgar Devonian. . . They hold together like burrs; oftend one, and all will revenge his quarrel. Incy lingered on, becoming more and more absorbed into the general mass of the less mentioned, till the present time. The last remnants, probably, but not cortainly descendants, were in Nymet Reland, in North Devon, and bore the name of Cheritm. They lived in semi-nakedness and in utter savagery in an old cottage of clay, of which one wall had fallen and most of the roof had given way so that in the only room grass grow on the way, so that in the only room grass grew on the earth floor. They claimed a small tract of land as their own, upon which probably their forefathers had squatted. They stole what elethes they required, and were continually getting inte trouble with the police, one of whom was felled to the earth by a blow of the fist of one of the girls. They were finely built, muscular, and streng. The patriarch of the family died at Whitstone, having spent the decline of his days in an old cider cask. After the death of the grandmother, about 1860, the family got into difficulties of one sort or another, and were dispersed.

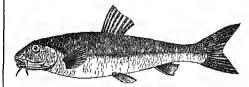
Gubbio (anc. Iguvium or Engubium), a city of central Italy, on the south-western declivity of the Apennines, 20 miles NNE, of Perugia. It has a 13th-century cathedral, several medieval palaces—the Brancaleoni with a valuable pieture-gallery—and remains of an ancient theatre. The celebrated Enguline Tables (q.v.) are preserved in the town-house. Gubbio was noted for its majolica ware, which was brought to perfection by Giorgio Andreoli in 1517–37, by his delicate use of a beautiful ruby lustre. Two celebrated yellow lustres were also used on Gubbio majolica. A few factories still imitate the medieval fayence. From a town of 30,000 inhabitants, it has dwindled to (1885) 5540 since its incorporation in the duelty of Urbino in 1384.

Guben, a manufacturing town and river-port of Prussia, in the province of Brandenburg, at the head of the navigable portion of the Neisse, 28 miles S. of Frankfort-on-the-Oder. The principal staples are hats and cloth. There are also wool spinning, tanning, machine factories, &c. The town was destroyed by the Hussites in 1434 and 1437, and was twice occupied by the Swedes during the Thirty Years' War. Pop. (1875) 23,738; (1885) 27,086.

Gubernatis, Angelo de, an eminent Italian orientalist and busy litterateur, who was born at Turin, April 7, 1840. He studied at the university there, and afterwards at Berlin under Bopp and Weber; and was appointed extra ordinary professor of Sanskrit at Florence in 1863, and ordinary professor in 1869. Becoming attracted by the wild socialistic dreams of Bakunin, he left his chair in order to he more free, and married Bakunin's niece; last a closer acquaintance with subversive socialism soon restored him to his reason. He became a candidate anew for his chair, and after some not unnatural hesitation was re-elected. His earliest works were mostly contributions to Sanskrit scholarship, alternating with incessant contributions to his own and to others' journals. He made his reputation European by his Zoological Mytheology (Tard 1979) ms roputation European by his Zoological Mythology (Lond. 1872), a work hopelessly marred by rashness in speculation, but yet serviceable; Storia comparata degli usi Natalici (1872), Storia comparata degli usi Funcbri (1873), Mitologia Vadica (1875), Storia dei Viaggiatori Italiani uelle Indie orientali (1875), Mythologie des Plantes (Paris, 1878), Lettere sopra l'Archeologia Indiana (1881), and Lettere sopra l'Mitologia comparata (1881), and Lettere sopra ha Mitologia comparata (1881). In the region of biography and literary history he has published Ricordi biographici (1873), the great Dizionario biografico degli Scrittori contemporanei (1879-80); monographs upon Giovanni Prati, Manzoni, and others; and finally Manuale di storia della Litteratura Indiana (1882), and the ponderous Storia universale della Litteratura (15 tella 1898-85). De Cubarrettic kase della Litteratura (15 tella 1898-85). vols. 1882-85). De Gubernatis has shown throughont his career phenomenal industry and many-sidedness, and has made real contributions to learning, but he must not be taken too seriously as a mythologist.

Gudgeon (Gobio), a genus of small, earp-like (Cyprinoid) fishes common in the fresh waters of Enrope. The dorsal fin is short, without a spine; the mouth is directed downwards, and has little barbules at the angles; the scales are of moderate size; and there are two rows of hooked pharyngeal teeth. The common gudgeon (G. fluviatilis), which abounds in many English rivers, especially in those that run over gravel, is a small fish rarely exceed-

ing 8 inches in length, with upper parts olive-brown. spotted with black, and the under parts white. The gudgeons swim in shoals, and, like the barbels, feed on worms, molluses, and other small animals.



The Common Gudgeon (Gobio fluviatilis),

Angling for gndgeon requires no art, so readily are the fish lured. Though small, the fish are esteemed for the table. Besides the British gudgeon, which is widely distributed on the Continent, there is only another species (G. aranoscopus), also Enropean, lunt apparently restricted to the river-basins of the Danube and Dniester; allied genera occur in the East.

Gudrun, or Kudrun, an old German cpic, built up ont of the popular songs and traditions of the seafaring folk who dwelt on the shores of the North Sea between Elhe and Seine. It relates the history of three generations of the kings of the Hegelings (Frisians), and in the third part tells how Gudrun, the daughter of Hettel, king of the Hegelings, was carried off from her home by Hoehmut, son of the king of Normandy, how she preferred to work like the lowest maidservant in the house of Hochmut's mother, and endure the greatest indignities, rather than break her troth pledged to Hewig, king of Zealand, and how finally she was rescued by her brother and her betrothed. This poem, which has been entitled the German Odlyssey, as the Nibelungenlied is sometimes called the German Hiad, was written, or rather arranged and edited, by an unknown poet in Anstria, in all probability in the end of the 12th century. The hest editions are by Karl Bartsch (4th ed. 1880), Martin (1872), and Symons (1883); and the best translations into modern High German by Simrock (8th ed. 1873) and Weitbrecht (1884).

Gnebres (from Turkish gianur; cf. Arab. kafir, 'unbeliever'), the followers of the ancient Persian religion as reformed and consolidated by Zoroaster. The name Gnebres is supposed to have been first bestowed upon this sect by their Arabic conquerors in the 7th century; they are also known as Parsees (q.v.). See also Persia, Zoroaster.

Guebwiller. See Gebweiler.

Guelderland (Geldern, Gelderland), a province of the Netherlands, is situated between the Zuider Zee on the north-west and the Prussian dominions on the south-east. It has an area of 1957 sq. m., and a pop. (1885) of 490,905, two-thirds Protestants. It is watered chiefly by the Mense, the Yssel, the Rhine, and the Waal. The surface is undulating, and about Arnheim, the capital, and Nimeguen are the most picturesque districts in the Netherlands. The climate is healthy, and the soil, though very unequal, is on the whole good; the southern district, Betuwe (see BATAVI), is one of the most fertile tracts in Europe. Agriculture is prosecuted with great success. Wheat, rye, buckwheat, tobacco, &c. are extensively grown. Among the mannfactures, beet-sngar, spirits, bricks and tiles, paper, and cotton goods are the principal. The duchy of Gueldres or Guelderland was more extensive than the modern Dutch province, stretching southwards along the Meuse to beyond Venlo. It was originally inhabited by the Batavi and Sigambri, and after

them by the Franks. In 870 it passed to Germany; and in the end of the 11th century became a territorial power, its ruler bearing the title of count. This was exchanged for the higher title of duke in 1383. These dynastic princes maintained their independence for just one century longer; in 1483 their duchy was taken possession of by Maximilian of Austria. Yet it was not until 1543 that the power of the Duke of Gueldres was finally broken and his land definitively incorporated with the Austrian Netherlands. On the revolt of the northern provinces of Holland the northern part of (fueldres threw in its lot (1579) with them, The latter was given up to Prussia in 1713. By the peace of 1814 Gueldres was finally divided between Holland and Prussia.

Guelder Rose, a cultivated form of Viburnum (see Viburnum), also popularly named ll Tree. The normal or wild form of the Snowball Trec.

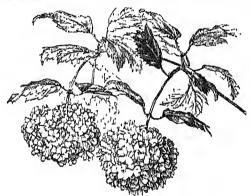


Fig. 1 .- The Gueldor Rose.

gnelder rose is a pretty plentiful native of England and Ireland, but is loss frequently to be found in a wild state in Scotland. It is widely distributed in Europe and Bussian Asia, and even extends into the Arctie regions, Its flowers appear in early

sminner in lather

dense cymes, 2 or 3 inches in diameter; the onter

much enlarged, at-

taining about an inch in diameter,

become

flowers



a, flower; b, fruit of Viburnum Opulus.

but, having neither stamens nor pis-Fig. 2: tils, are perfectly barren. The inner

flowers are small, white, with two or three pistils on very short styles, and are followed by globular, blackish-red berries. In the cultivated form the flowers are all monstrous and harren, like the outer flowers of the cymes of the wild form; and crowded as they are together in the cyme, the structure of which is not expected. which is not enlarged, the inflorescence assumes the form of a compact ball, hence the name Snow-ball Tree. In cultivation the plant attains the proportions of a small tree, and flowers most freely When in flower in after it has acquired some age. May and Juno it is one of the most ornamental of hardy trees, and is therefore planted largely in pleasure-grounds and shrubberies. The wild form is reared from seeds and cuttings, the monstrons form from outtings or layers only.

Guelph, an inland port of entry in Ontario, capital of Wellington county, on the river Speed,

45 miles W. by S. of Toronto by rail. It is the seat of the Ontario Agricultural College, and has several flour-mills, woollen-mills, and manufactories of sewing-machines, &c., the Speed supplying abundant motive-power. Pop. (1886) 10,216

Guelphic Order, an order of knighthood for Hanover, instituted by George IV., when Prince Regent, in 1815. It is both a military and civil order, and is unlimited in number. See Ogders.

Guelphs and Ghibellines, the names of two great parties, the commen neurons and the late of the history of Italy and be said almost to cpitomise the history of Italy and the late century. The great parties, the conflict between which may origin of these names was formerly the subject of much speculation; but historians are now agreed in tracing them respectively to the two families, Welf and Waiblingen, which in the 12th century were at the head of two rival parties in the German empire, and whose fends came to be identified histhree parties contended. Welf was the personal name of a prehistoric founder of the family still represented in the royal (English) and ducal houses of Brunswick; Waiblingen, a small town in Wirttemberg, was a possession of the House of Hohen-stanfen. The assumption of the names as party names is traditionally fixed at the buttle of Weinsberg, in Swabia, 1140, between the Emperor Conrad of Hohenstaufen (Duke of Franconia) and Welf, uncle of Henry the Lion, Duke of Saxony, when the uncte of Henry the Laon, Duke of Saxony, when the leaders callied their followers by the respective warcies, 'Hie Waiblingen!' 'Hie Welf!' It may be mentioned that Matthew Villami ingeniously gives as etymology of Chibellini, Cuida belli or guidatori di battaglic, 'leaders in battles;' of Chelfi, guardatori di fc, 'defenders of the faith.'

As the chief theatre of the conflict of theso parties

was Italy, the original names look the Italian forms of Ghibellini and Guelfi. The former may, in geneauthority in Italy, the latter as the opponents of the emperors. The opposition to imperial authority in Italy arose from two distinct parties, which, for the most part, made common cause with each other -from the church, which asserted its own spiritual independence, and from the minor principalities and free cities, which fought for their provincial or municipal rights and liberties. Eive great cities in the strife of the Guelph and Ghibelline parties are commonly noted by historians: under Henry IV., in 1055; under Henry the Proud of Bayaria and Sayaray in 1127; under Henry the Line in and Saxony, in 1127; under Henry the Lion, in 1146; under Frederick Barbarossa, in 1159; and in the pontificate of the great champion of churchman-ship, Innocent III. The cities of northern Italy were divided between the two parties—Florence, Bologna, Milan, Piaccuza, Modena, Ravenna, and others, as a general rule, taking the side of the Gnolphs; while Pisa, Lucca, and Arezzo were Chilhelline. Several important enties transferred their sympathies from the one party to the other according to the exigencies of domestic politics. The great Italian families, in like manner, took opposite sides; but the policy of each family frequently varied from one generation to another. In general, it may be said that the nobles of the more northern provinces of Italy inclined to the Ghibel-line side, while those of the central and southern provinces were Guelph. By degrees, however, especially after the downfall of the preponderance of the Gorman emperors in Italy, the contest ceased to be a strife of principles, and degenerated into a mero struggle of rival factions, who availed themselves of the prestige of ancient names and tradi-tional or hereditary projudices. Even in 1272 Gregory X. could with truth reproach the Italians with their sauguinary animosities for the sake of

what were but names, the meaning of which few of them could understand or explain; and, in the following century, in 1334, Benedict XII. practically disallowed altogether the reality of the grounds of division between the parties, by prosentling, under pain of the censures of the church, the further use pain of the censures of the current, the further use of those once-stirring names, which had long been the rallying words of a pitiless warfare. From the 14th century we read little more of Ghielphs or Ghibellines as actually existing parties; but in the sense already explained the conflict of principles which they represent is found in every period of political history. See Bryce, The Holy Roman Empire (7th ed. 1884) Empire (7th ed. 1884).

The reigning family of Great Britain occupy the throne in virtue of the Act of Settlement of 1701, which made Sophia, daughter of Frederick, elector which made Sophia, dangitter of Frederick, elector Palatine, and of Elizaheth, daughter of James I. of England, heiress of the English crown. Sophia married Ernest Augustus, Duke of Hanover, the fourth son of George, Duke of Brunswick-Lunehurg, a direct descendant of the prince of Guelph hlaod in whose favour Frederick II. created the duchy of Brunswick-Lunehurg in 1235. See Handard

OVER.

Guercino, 'the squint-eyed,' properly GLAN-FRANCISCO BARBIERI, a painter of the Bolognese school, was born 2d February 1590, at Cento, not far from Bologna. His earliest studies in painting far from Bologna. His earliest studies in painting were made in his native town; then from 1619 to 1623 he visited different cities of Italy, partienlarly Rome and Venice, to improve himself in his art. In 1642 he went to live at Bologna, where he became the head of a flourishing school of painting, and there he died 22d December 1666. Guercino's carly paintings show perceptible signs of L. Caracci's and Caravaggio's influence. Later in life he softened the harshness of his light and shade contrasts by more harmonious colouring in Guido Reni's style. more harmonious colouring in Guido Reni's style. He left a very large number of pictures. His masterpieces are considered to be the fresco of 'Amora,' in the Villa Ludovisi; the 'Death of Dido,' in the Spada Palace; and 'Saint Petronilla,' in the Capitolino Gallery, all three at Rome.

Guerieke, Heinrich Ernst Ferdinand (1803-78), a theologian belonging to the Old Lutheran school, was professor at Halle, and author of a well-known Handbuch der Kirchengeschichte (1853; 9th ed. 1866-67); of a Christliche Symbolik (1859; 3d ed. 1861); and of a Lehrbuch der Christlichen Archaelogie (1847; 2d ed. 1889).

Guericke, Otto von, a celebrated physicist, was born at Magdeburg, in Prussian Saxony, 20th November 1602. His personal history contains nothing of interest. As a natural philosopher he is chiefly known by his experiments regarding the nature and effects of air, his discovery of the airpump (1650), and of the Magdeburg Henrispheres (q.v.). Ho made also some notable observations in electricity. He was for a time engineer in the Swedish army, and afterwards Burgermeister of Magdeburg. He died at Hamburg, 11th May Magdeburg. 1686.

Guerillas, the name given to armed bands who, on occasion of foreign invasion or civil war, carry on an irregular warfare on their own account. This class of fighters belong peculiarly to Spain, where from 1808 to 1814 they were systematically organised against the French, whose operations they very seriously embarrassed. The country itself also suffered from them. Many of them, particularly Mina's band, joined Wellington, and, after having undergone a course of discipline, rendered saving largerylar agencylar troops. On the conclusion signal service as regular troops. On the conclusion of peace large numbers were organised into robber-bands. In most of the civil wars of Spain since 1820 guerilla warfare, especially in the Basque provinces, has played a prominent part. BRIGANDS. See

Guérin, Georges Maurice de, a young poet of exceptional genius, was born at the château of Le Cayla in Languedoc, 4th Angust 1810, and was educated for the church at a Tonlouse seminary and the Collège Stanislas, Paris, after which he entered the community gathered together by Lamennais at La Chesnaye in Brittany, but followed his master in his estrangement from Rome and renonnced his novitiate in October 1833. He next went to Pais to try journalism, and became a teacher at the Collège Stanislas, but married a rich Creole lady in November 1838, and entered on a new life of rest and happiness, which was ent short by his nationally death of consumption, 19th July 1830. An article by George Sand in the Revue des Deux Mondes (May 15, 1840) first drew Actual des Deux Mondes (May 13, 1840) inst drew attention to his genins: his Reliquia, including the Centaur (a kind of prose poeu), letters, and poems, were published in 1860, edited by G. S. Trebutien, with a critical notice by Sainte-Benve. In the words of the latter, 'no French poet or painter has rendered so well the feeling for nature—the feeling poet so much for the latter. not so much for details as for the ensemble and the not so much for details as for the ensemble and the divino universality, the feeling for the origin of things and the sovereign principle of life. —EUGENIE DE GUERIN, his sister (1805—48), had something of her brother's genius grafted upon a profound and mystical religion, and devoted herself with more than sisterly devotion to his memory. Her own Journals were published in 1861; her Lettres, in 1861. Both were translated into English Both were translated into English.

See Sainte-Beuve, Causeries du Lundi (vol. xii.) and Nouveau. Lundis (vol. ni.); Marelle, Eugénie et Maurice De Guéria (Bellin, 1869); Harriet Pair, M. and E. De Guéria, a Monograph (1870); and Matthew Arnold's Essays in Criticism (1865).

Guérin, Pieire Narcisse, Baron, French painter, was born at Paris, 13th May 1774. A pupil of Regnault's, he first attracted notice by his 'Marchs Sextus' (1799), the first of a series of classic subjects, skilfully treated, but showing something of melodiamatic effect. After a visit to Rome and Italy in 1802, he settled in Paris. From 1822 to 1829 he was director of the French Academy of Painting in Rome, and he died there on 6th July 1833. Amongst his pupils were Géricault, Delacroix, and Ary Scheffer.

Guernsey, the second in size of the Channel Islands (q.v.). It is about 30 miles in circumference, and 28 sq. m. in area. Pap (1861) 29,805; (1881) 32,607, of whom more than half are females. The lowest part is to the north (L'Ancresse), the highest to the south (Haut Nez) heing 349 feet above sea-level. St Peter Port, the only town, has a good harbour, open at all tides; there is a large public school, founded 1563, and named after Queen Elizaheth; a fine elmreh, dating from the 12th controver which has been well restored. the 13th century, which has been well restored; a library with museum and lecture-rooms due to the beneficence of Messis Guille and Alles; and another at Candie House, founded by the late O. de B. Priants. There is also a good public market, a ladies' college, poor-house, and lunatic asylum. Guernsey consists entirely of primitive rock covered with gravel and a surface of sandy loam. The climate is equable and favourable to the growth of fruit, flowers, and vegetables. Twothirds of the island are under cultivation, and great quantities of fruit and vegetables are exported to England, as is also a hard gray granite much used in huilding. It is 127 miles from Land's End, 109 from Falmonth, 113 from Sonthampton, 69 from Start Point. Steamers to England daily, Sundays excepted. Taxation is light; the annual revenue of the bailiwick-which includes Alderney and Sark —is £30,000, derived from harbour-dues, excise, market-dues, and sundry other sources. The island is divided into ten parishes, each administered by a doucaine of twelve ratepayers. There is a separate lieutenant-governor for Guernsey appointed by the crown, and the constitution is similar to that of Jersey (q.v.), but more oligarchic. It is said that there are no moles or reptiles in the island.

Guerrazzi, Francesco Domenico, Italian patriot and brilliant writer, was horn at Leghorn, 12th August 1804, and, educated for the legal profession, won a great reputation among his countrymen by his political fictions, which exercised an immense influence on contemporary Italian events by their exalted strain of patriotic enthusiasm. Guerrazzi's own words are, 'he wrote a book when impotent to light a battle.' On the eve of the definite breach between the people and the Grand-duke of Tuscany in 1849, Gnerrazzi was induced to accept office in the ministry. On the flight of the Grandduke he was proclaimed member of the provisional government, and subsequently dictator. During this crisis of the state he energetically refused his adhesion to the substitution of republicanism for monarchy; and preserved the strict antonomy of Tuseany until the return of the grand-ducal rule. Then be was immediately seized and imprisoned on the grounds of having neglected due measures of repression when the revolution first gathered strength during his ministry. His defence, entitled Apologia della vita Politica di F. D. Guerrazzi (1857), is a masterpiece. After an imprisonment of three years, he was condemned for life to the three years, he was condemned for life to the galleys, but was subsequently permitted to select Corsiea as the refuge of his perpetual banishment. Restored to liberty and action by later events, Guerrazzi sat in the parliament of Turin in 1862 and 1865. He died 23d September 1873. His chief works of fiction are La Bathaglia di Benevento, remarkable for exquisite expression and beautiful poetic imagery (1827, fifty times reprinted); L'Assedio di Firenze, a magnificent historical novel, treating of the downfall of the republic of Florence (1836, more than thirty times reprinted): Labella (1836, more than thirty times reprinted); Isabella Orsini (1844); Beatrice Centi (1854); L'Asino (1857). There are works on Guerrazzi by Cerona (1873), Fenini (1873), and Bosio (1877); and Carducci has edited his Letters (2 vols. Leghorn, 1880-82).

Guerre'ro, a sonthern state of Mexico, on the Pacific, with an area of 22,863 sq. m. It is a broken mountainous country, rield in minerals, fertile in the upland valleys, and enjoying a favourable climate except on the coast. Pop. (1888) 331,827. Capital, Chilpaneingo (6000); chief port, Acapulco (q.v.).

Guesclin, Bertraand Du, Constable of France, was born of an ancient family near Dinan in the district of Rennes, about either 1314 or 1320. From his boyhood upwards he excelled in all martial exercises. In the contests between Charles de Blois and Jean de Montfort for the dukedom of Brittany he took part with the former, especially distinguishing himself at Vannes (1342). After King John had been taken prisoner by the Black Prince at the battle of Poitiers in 1356, Du Gueselin contended successfully against the English, his valour and military skill being especially shown at Rennes (1356) and Dinan (1357). Then, entering the service of the Danphin, afterwards Charles V., he took Melun (1359) and several other fortified towns, and freed the Seine from the English. Ou Charles's accession to the throne in 1364 Dn Gueselin was created governor of Pontorson, and in May of the same year gained the lattle of Cocherel against Charles the Bad of Navarre.

But on the 29th September following he was defeated and taken prisoner by the English, under Sir John Chandos, at the battle of Array, and only liberated on payment of a ransom of 100,000 livres. He next supported Henry, Count of Trastamare, against Pedro the Crnel, king of Castile, but was defeated and taken prisoner by the Black Prince near Najera (1367). Being again ransomed on payment of a large sum, Du Gueselin renewed the contest, and in 1369 defeated and captured Pedro at Montiel, and placed the crown of Castile on the head of Henry of Trastamare. Immediately afterwards he was recalled by Charles V. of France, at that time hard pressed by the English, and was raised to the dignity of Constable of France. In the year 1370 Du Gueselin opened his campaigns against the English, and in a few years the whole of their possessions were in the hands of the French, with the exception of a few fortified towns. While assisting at the siege of Châteauneuf de Randon, in Languedoc, Du Gueselin was taken ill, and died July 13, 1380. See Lives of him by Guyard de Berville (1767; new ed. 1882), Jamison (2 vols. Charleston, 1863), and Luce (2d ed. Paris, 1883).

Guest, Edwin, a learned antiquary, born in 1800, entered Cains College, Cambridge, in 1820, was eleventh wrangler in the Mathematical Tripes of 1824, and was thereafter elected to a fellowship. He was called to the bar, but did not practise, and early gave himself to antiquarian and literary studies. The only book be published was his well-known History of English Libythms (1838; 2d edrevised by Professor Skeat, 1882)—a werk of great erndition, and written, moreover, before the era of good editions of old English poetry had begun. His frequent papers on the early history of Roman and Saxon England and the English were printed in the Archæological Journal and the Transactions of the Archæological Institute and other learned institutions, and earned the praises of scholars secritical as Mr Freenan. These were collected postminously, filling the second volume of Origines Celticae (a Fragment), and other Contributions to the History of Britain (2 vols. 1883). The first volume was devoted to the Celts and their ethnelogical and philological affinities; but, truth te tell, this work, laborious as it is, was conceived in a pre-scientific spirit, and its elaborate etymologies are valueless. In 1852 Guest succeeded Dr Chapman as Master of Caius College, Cambridge, and next year received the degree of LL.D. He became F.R.S. in 1841, and was Vice-clanceller of the university in 1854. He resigned the mastership but a few weeks before his death, which took place on November 26, 1880.

Gueux, or 'The Beggars,' the name assumed by the confederated nobles and other malcontents who opposed the introduction of the Inquisition into the Low Countries by Philip II. of Spain. Forming themselves into an association, November 1565, they presented, on 5th April following, a formal protest to the regent, Margaret of Parma. Their distinctive party name they adopted from an abusive opithet applied to them on that occasion by one of Margaret's courtiers. The 'beggars,' who represented the national feeling of the country, maintained a long and vigorous contest against the despotic proceedings of Philip and his advisers, but were ultimately compelled to succenub to superior force. A branch of them, 'the Beggars of the Sea,' under the leadership of the bold Count de Ia Marck, seriously harassed the Spanish fleet, captured transports with supplies for Alva's army, seized several fortresses, and succoured besieged places along the coast. Their capture of Briel in April 1572 was the beginning of the war which

terminated in the independence of the Netherlands in 1648. See HOLLAND.

Gnevarism. Sec Euphuism.

Guevi. See Antelope.

Guglielmi, Pietro, a celebrated musician and composer, was born at Massa di Carrara in May 1727. His first opera, composed at the age of twenty-eight, was greeted with enthusiasm at Turin. He visited the chief cities of Italy, every-where with success. After a residence of some months at Dresden and various other towns, Gugmonths at Dresden and various other towns, englielmi passed over to London, where he remained five years. At the age of fifty he returned to Naples with the double prestige of great fame and wealth, and in 1793 Pope Pins VI. appointed him Maestro di Cappella at St Peter's. He died 19th November 1804. Among his most popular operas were La Didone; Enca e Lavinia; I due Gemelli; La Serva Innamorata; La Pastorella Nobile; La Balla Pescutrice. Bella Pescutrice.

Guiana, in its widest signification, is the region lying between the Orinoco and the Amazons in South America, with the Atlantic on the cast and no definitive boundaries on the west. It consists of five divisions, known respectively as Veneznelan, British, Dutch, French, and Brazilian Guiana, the first named situated to the west of the next three, and the last named to the south of all four. But both Venezuelan and Brazilian Guiana being in-

both Venezhean and Brazilian Ginana heing incorporated in those states, we have to describe
here only British, Dutch, and French Guiana.

These three colonies abut upon the Atlantic, in
the order named, between Venezhela on the north
and Brazil on the south. The physical conformation is practically the same in all three. Next the
Atlantic is a fringe of alluvial soil, lying in many
parts below the semicol and generally immediated parts below the sea level, and generally inundated in the rainy seasons, with mud-flats skirting the in the rainy seasons, with mud-flats skirting the coast and sandbanks jutting out into the ocean; these last are generally held together by the roots of mangrove-trees, though not unfrequently they are of a shifting character, forming temporary islands and moving about under the impulse of wind and tide and river current. This alluvial zone, varying in width from 10 to 40 miles, and consisting principally of blue argillaceons soil, of very great fertility, contains virtually the only cultivated territory in the three colonics. Beyond it the contour rises by a series of short terraces or land waves up to an undulating savannah region land waves up to an undulating savannali region of moderate elevation (average 150 feet), which is formed geologically of the accumulated detritus brought down from the primitive mountain masses in the interior. The third and innermost division of colonial Guiana consists of the upland country, a plateau region ridged with mountain-chains (which rise in places to 3000 or 3500 feet), and everywhere covered with a dense primeval forest, exceptionally rich in magnificent timber-trees-rich not only in the quality of the timber, but also in the variety of the species. This division is as yet almost wholly unknown, save that the courses of most of the larger rivers have been explored to their sources

Rivers.—The whole of Guiana is well provided ith rivers. Most of them flow north or northwith rivers. east to the Atlantic, and bring down with them vast quantities of sedimentary matter, which becomes deposited as the alluvial mud of the coast. These streams, although they are of admirable service for irrigation purposes, are of little use as waterways for navigation, owing to the mudbanks which choke their mouths, the sandbanks which obstruct their channels, and the numerous falls and cataracts by which their waters descend from the highlands and savannah plateaus to the lowlying coastal belt. Up to the line of the rapids 237 and falls, however, they are navigable by small vessels for distances varying from 10 to 150 miles. Several of them are connected together in their lower courses by cross-channels and artificial canals. Indeed, communication in the colonies is

principally effected by water, not by land.

Climate.—The climate, as beseems a region lying between 1° and 8° N. lat., is hot and moist, but on the whole tolerably uniform. Generally speaking, the thermometer ranges from a maximum of 95° to a minimum of 70° F.; the average, however, deviates but little from 80° to 84° F. The heat is tempered by sea-breezes during greater part of the year. The rainfall is heavy; the average for British and Dutch Guiana is 75 to 100 inches annually, and in French Guiana it is still heavier, sometimes reaching 140 inches in the year. The precipitation is, however, greatest in the interior; bence the great number of rivers fed from the wooded mountain-slopes inland. Two rainy and wooded mountain-slopes inland. Two rainy and two dry seasons are distinguished: the former last as a rule from December to February and from April to August. Hurricanes are extremely rare.

Flora.—As would be expected from the nature of the country, vegetation is of extraordinary richness and luxuriance. Many of the numerons timber-trees are valuable for shipbuilding, honse building, tooling, cabinetmaking, &c. Several useful gums are yielded, and also balsams, wax, bark, fibre, oil, nuts, juices, medicinal preparations, &c., caout-chone, halata gnu, copaiba balsam, carapa-seed oil, sarsaparilla, einchona, laurel oil, calabashes, silk cutton, touqua beans, arnotto, Bromelia flax, angelica, cotton, tohacco, &c. The best-known foodplants comprise the cassava, sweet potata, arrownoot, capsicum or Spanish pepper, tomato, guava, cherry, avogato, bread-fruit, melou, granadilla, banana, pine-apple, earth-unt, yam, rice, and maize. Besides these there is a prodigious quantity of creepers, ferns, tree-ferns, and flowers; amongst these last must be specially named the orchids, which often form a continuous carpet along the tops of the forest trees, and the magnificent Victoria regia lily.

Fauna.—The most conspicuous branch of the Funa.—The most conspicuous branch of the fama is the birds, the most characteristic forms being the stink-bird (a vulture), eagles, owls, nightjars, humming-birds, the bell-bird, several passerine species, orioles, a wren, toncans, jacamars, trogons, pulf-birds, kingfishers, anis, parrots, the cock of the wood, emrassows, tinamous, trumpeters, the jacama, the horned screamer, sand-pipers the supplifters, herens duelts, and diverse the supplifters. pipers, the sun-bittern, herons, ducks, and divers. Manimals are not so plentiful as the extensive uninhabited forests might perhaps suggest. are represented by jaguais, tiger cats, peccaries, tapirs, deer, sloths, armadillos, ant-eaters, agoutis, capybaras, onossums, raccoons, coatis, porcupines, squirrels, monkeys, martens, lish-otters, and manatees. Other forms of animal life are swarms of insects, including butterflies, crickets, mosquitoes, sandflies, and jiggers; turtles and tortoises, creediles, iguanas, fregs, snakes, including the anaconda and whip snakes; several Siluroid fishes, the electric eel, rays, sharks, and the sawlish.

Indians.—The native Indians, who still for the

most part lead a 'wild' life in the forests, constitute several different tribes, and seem to belong to what were probably two distinct stocks, the indigenes and their original conquerors, the Caribs. In many parts of Guiana rude attempts at picture writing exist on the rocks and faces of the hills. Two varieties have been discriminated—one deeply incised, the other merely scratched. Who the anthors were is not known with certainty; they are generally believed to have been the ancestors of the existing Indians, who, however, have

450 GUIANA

preserved no traditions relating to the inscrip-

History.—The first Europeans to explore the coast of Guiana seem to have been the Spaniards Alonzo de Ojeda in 1499 and Vicente Pinzon in Several attempts were made by adventurers of different European nations to found colonies in this region in the later part of the 16th and the early part of the 17th centuries. To this period belong Raleigh's and the other expeditions which visited this part of South America in search of the fabulous gold city El Dorado (q.v.) and the Lake of Parima. Apart from semi-bnecaneering expeditions and landings, the first successful colonisation of Guiana scens to have been made by the Datch, on the Essequibo, shortly before 1613. The English got firm footing at Surinam in 1650, and the French on the Kouran and Oyapoek in 1664. Two years later the English scized both French and Dutch Guiana, but restored them in 1667, and at the same time handed over Surinam to the Netherlands in exchange for New Amsterdam—i.e. New York. The French, in 1674, renewed their attempts to settle at Cayenne, and with success; that part of (inima has remained in their hands ever since. Except for two short periods (1781-83 and 1796-1802), the settlements on the Essequilo, Demerara, and Berbice and in Surinam were held by the Dutch down to 1803, when they were again taken passession of by the English, who at the peace of 1814 restored the last named, but retained the first three. Berbice was at first administered as a distinct colony, but in 1831 it was incorporated with the rest of British Guiana. During slave-holding times sugar-planting brought some degree of prosperity to these colonies; but their productiveness in this respect was very sousibly crippled by the abolition of slavery, which deprived them of their supplies of the requisite kind of labour for the plantations. Since that ovent coffee and cotton have almost cirticaly ceased to be grown; and the cultivation of beetroat for sugar caused a serious crisis in Guiana canoplanting. British and Dutch Guiana, however, still show signs of vitality: the cane-sugar industry, if not reviving, is at least not retrograde, whilst gold-mining is a decidedly progressive industry. Except for real mining reliable between dustry. Except for gold-mining, which however remains stationary, French Guiana is in a hopelessly deplorable condition.

BRITISH GUIANA, or DEMERIARA, with a coastline of 320 miles, is separated from Dutch Guiana
on the E. by the river Corentyn; on the S. and
W., next Brazil and Vonezuela respectively, the
boundaries have never been definitively determined.
The British make the limits of the colony extend
southward to the sources of the Essequibe in the
Acarai Mountains (ahout 1° N. lat. and 59° W.
long.), and trend thence nearly due east to the
head-waters of the Corentyn, whilst the west
boundary (going north) coincides with the Takutu
and Cotinga as far as Roraina; thence it preceeds
north-east to the Imataca range and onwards
north to the mouth of the Amaenro. The Venezuelans, however, claim all the region west of the
Essequibo right up to the sources of this river.
The area of British Guiana is approximately set
down at 76,000 sq. m. The western part of the
colony is diversified by chains of the Pacaraima or
Parima mountain-system, which stretch generally
from west to east, as the Imataca range in the
north, the Merumé or Pacaraima Mountains, which
riso to 3000 feet between 4° and 5° 30′ N. lat., and
to some 8000 or 9000 feot in the table-topped
Roraima (q.v.), and the Acarai Mountains, which
form the southern boundary of the colony as well
as the watershed between the Essequibo and the
feeders of the Amazons. Between the two ranges

last mentioned comes an eastward extension of the great Brazilian savannah region. The more important rivers are the Corentyn, Berhice, Demerara, Essequibo (with its tributaries, the Rapununi and the Mazuruni, and the Cuynni, an affluent of this last), Waini, and Barima, all flowing north into the Atlantic; and the Takutu, which, supplemented by the Ireng and Cotinga, feeds the Rio Branco, a left-hand tributary of the Anazon.

The leading industry of the colony is the cultivation of the sugar-eane. Wood-entting and gold-mining are the only other industries of any moment. The exports embrace sugar (average for six years ending 1888, 128,308 hogs-heads), rom (2,533,400 gallons), molasses (1,818,300 gallons), timber, shingles, charcoal, cocon-nuts, balata (86,942 lb. in 1887; 248,487 lb. in 1888), and gams. The export of gold increased from 250 oz. in 1884 to 6518 oz. in 1886, and 14,570 in 1888. The total value of the exports, which go principally to the United Kingdom (71 per cent. in 1885; 49 per cent. in 1888), United States (17 per cent. in 1885; 38 per cent. in 1882 to £2,024,733 in 1888. The imports (mostly from the United Kingdom), which consist chiefly of flour, rice, dried fish, butter, pork, and beef, averaged £1,710,504 for the six years ending 1888, having fallen from £2,224,000 in 1883 to £1,586,055 in 1888.

In 1881 the population was 252,535, and embraced Europeans, Creoles, negroes, cooles from India, Chinese, natives of Madeira and the Azores, and aboriginal Indians; but of these last enly 7656 are included in the census return. In 1888 the population was estimated at 278,477. Most of the plantation work is done by immigrant cooles from British India and by Chinese.

The colony is divided into three counties, Berbice, Demerara, and Essequibo. The ports are Georgetown (q.v.), the capital, and New Amsterdam. The administration is in the hands of the governor, appointed by the crown, and two legislative councils—the Court of Policy (10 members) and the Combined Court (16 members)—the latter having the control of the fluances. Slavery was abolished in the colony in 1834, though the importation of slaves from Africa had practically ceased

naving the control of the finances. Slavery was abolished in the colony in 1834, though the importation of slaves from Africa had practically ceased twenty years before. The colony possesses one line of railway, from Georgetown to Mahalea (21 miles long), telegraphic communication with Europe and the United States, and a good system of postage.

DUTCH GUIANA, or SURINAM, with an area of 46,058 sq. m., and a coast-line of 240 miles, has for its boundary on the west the river Carantan, on the

DUTCH GUIANA, or SURINAM, with an area of 46,058 sq. n., and a coast-line of 240 miles, has for its boundary on the west the river Corentyn, on the south the Acaral Mountains and their eastern continuation, the Tunne-Hinmae Mountains, and on the east the Maroni or Matowijn, which separates it from French Cuiana. It is, however, a matter of dispute between the French and the Dutch which of the two upper brauches of this last river—the right-hand arm, the Awa or Lawa, or the left-hand arm, the Tapanahoni—is the upper part of the main stream. The Dutch claim that it is the former, the French the latter. The other rivers of the colony are the Surinam, Sarumacca, Coppename, and Nickerie, all flowing into the Atlantic The greater part of the surface is covered with unexplored primeval forest, scavely more than 210 sq. un of the entire area being cultivated. Sugar and cocea are the staple productions. As in British Cuiana, cotton and coffee are not now cultivated, except a very small quantity of the latter. Cocea, which did shew an increasing return, seems to be falling off again. The chief exports are sugar (average for three years ending 188, 68, 130 tons), melasses (91,069 gallens), rum (48,000 gallens), cocea (15,405 tons), and gold (29,858 ez.). Geldmining has made rapid strides since 1875; the

export having increased in value from £2079 in 1876 to £90,461 in 1886, and £123,573 in 1888, though fully one-fourth more is sunuggled out of the colony. In the year 1887 new discoveries of gold were made in the district between the rivers Tapanahoni and Awa, the region, some \$000 sq. m. in extent, which is in dispute between Holland and France. The total annual trade in and out is valued at about £716,000. Trade is carried on principally with Holland, the United States, and Great Britain and her dependencies. The capital of the colony is Paramaribo (q.v.). The population, which is very heterogeneous, in 1884 numbered 52,978, of whom nearly one-half live at Paramaribo. In 1887 the total was given at 57,141. Besides these there were about 4000 Bush Negroes—i.e. negroes who escaped during slavery times and subsequently asserted their independence—and 1200 Indians. As in British Guiana, labour is principally performed by coolies from British India and by Chinese. The colony is divided into eight administrative districts and the town of Paramaribo, and is under the charge of a governor, assisted by an executive council. The members of the provincial estates, the legislative body, are elected by the people. Slavery was abolished in 1863.

French Guiana on the west by the Maroni, from Brazil on the south by the Tunne-Humac Monntains, and from the same country on the east by the Oyapock, although the French claim all the coastal districts as far south as the Amazons. The treaty houndary is the 'river of Vicente Pinzon,' the identity of which is the point in dispute; the French government, however, in 1856 expressed itself as willing to recognise the Araguary as the treaty stream. The north and north-east sides of the colony are washed by the Atlantic. Taking the Oyapock as the provisionally accepted boundary, the area of the colony is about 31,000 sq. m., whilst the length of coast-line is about 240 miles; the capital of the colony, stands on a rocky promontory, and a little farther to the north-west lie the Safety Islands (fles de Salut), behind which is the best roadstead in the colony. The undulating, heavily-timbered savannah region is crossed by one or two ranges of granite hills, nowhere exceeding 2600 feet in height. The culminating ridge, the Tunue-Humac Mountains, only rises 1000 feet higher. The more important rivers, which all flow into the Atlantic, are the Maroni, Mana, Sinnamary, Kouron, Apprenagne, and Oyapock.

mary, Kouron, Appranagne, and Oyapock.

The commerce is almost nil, the only exports being cocoa and arnotto (roucon), each to the extent of about 750,000 lb. annually. A little coffee is grown. Gold is mined, however, and an average of 59,679 oz., valued at about £223,100, are exported annually. Probably half as much again is sninggled out of the country. In 1883 the total exports, exclusive of gold, were valued at £17,135 only, and the imports at £356,311; in 1887 the two together amounted to £33,580. The population of the entire colony only amounted to 26,905 in 1886. The number of the inhabitants is slowly but surely diminishing; the marriages of people of European blood show a remarkable degree of sterility, and the infant mortality is great. The prevailing diseases of the swampy coast-lands are malarial fever, dysentery, anæmia, and yellow fever. From 1853 to 1864 an attempt was made to found penal colonies in French Guiana, all of which proved disastrous, partly owing to the management of the

penitentiaries. The immigrant criminals now come (since 1864) exclusively from Africa (Arabs and negroes) and Asia (Annamites). Slavery was abolished in 1848.

abolished in 1848.

Bibliography.—Of British Guiana: Hartsinck, Beschrijzing van Guiana (1770); R. H. Schomburgk, Description of British Guiana (1840), Reizen in Guiana, 1835-39 (1841), and papers in Geog. Journ. (1836-44); Richard Schomburgk, Reizen in Britisch-Guiana, 1840-44 (1848); Dalton, History of British Guiana (1855); C. B. Brown and J. G. Sawkins, Geological Survey of Brit. Gu. (1875); Boddam-Whetham, Roruima and Brit. Gu. (1879); Im Thurn, Amony the Indians of Gu. (1883); Bronkhurst, Brit. Gu. (1883); Netscher, Geschiedenis van Essequebo, Demerary, en Berbice (1888); Brit. Gu. Directory (1888), with bibliography (pp. 395-404); and the magazine Timchri (Georgetown, 1887-88). Of Dutch Guiana: Palgrave, Dutch Gu. (1876); and Kappler, Surinam (1887). Of French Guiana: Crevaux, in Bull. Soc. Géog. (1878); Nibant, Gu. Française (1882); Rambaud, La France Coloniale (1886); Lanessan, D'Expansion Coloniale de la France (1886); Coudreau, in Bull. Soc. Géog. de l'Est (1868-87) and Rev. de Gioy. (1888). See also Annals of Guiana (1888), by Redway and Watt; and Kaart van Guiana, by W. L. Loth (Amsterdam, 1889).

Guiana Bark, French, the bark of Portlandia hacandra, also called Conteria speciosa, a tree of the natural order Cinchonacea, with opposite ovate leaves, and corymbs of very large purple flowers, a native of Guiana. The bark is esteemed a very powerful febrifuge, and the value of Warbury's Fever Drops is believed to depend mainly upon it.

Guiceiardini, Francesco, an Italian statesman and historian, was born of noble parentage at Florence in 1483. The combined studies of law and literature engrossed his attention at first; and at the age of twenty-three he was elected professor of Law at Florence, where he also practised as an advocate. But his real field was diplomacy and statesmanship, as understood at that time in Italy—the diplomacy and statesmanship of Macchia-velli. His apprenticeship served in Spain (1512–14), he became papal ruler of Modena and Reggio (from 1515) under Leo X. and Clement VII., and afterwards of Parma (1521), the Romagna (1523), and Bologna (1531). Retiring from the service of the pope in 1534, he was mainly instrumental in seenring the election of Cosmo de' Medici as duke of his native city, Florence. But, being disappointed in his ambitious design of acting as mayor of the palace to this young prince, Guicciardini withdrew to Arcetri, and busied himself, till his death in 1540, with the composition of a great work, Storia d' Italia, a dispassionate and coldly analytical history of Italy between 1494 and 1532. This work was edited by Rosini in 10 vols. (Pisa. 1819). In 1857-67 there appeared at Florence, in 10 vols., the Opere Incidite of Guicciardini, containing Ricordi Politiri, a series of aphorisms on political philosophy; Reggimento di Firenze, a discourse on the forms of government suited for an Italian state; and Storia Fiorentina. See Edinburgh Review (1869); and Gioda, Guicciardini e le sue opere incidite (Milan, 1880). His Maxims were translated into English by N. H. Thomson in 1890.

Guicowar (Gaikwar or Gaekwar), the designation of a powerful Mahratta prince, ruler of the state of Baroda (q.v.) in Gujarat. Piláji, who became Guicowar in 1721, by predatory excursions gradually acquired authority over Gujarat; and his son Damáji ultimately threw off his allegiance to the Peishwa. Malhar Rao, installed in 1871, was in 1873 accused of attempting to poison the British Resident, tried, and deposed. See Baroda.

Guidebooks. When in 1829 Mr John Murray began that series of travels, personal observations, and private studies which issued in 1836 in his Handbook for Holland, Belgium, and North Germany (the first work in English to which the name of 'Handbook' was applied), there was in existence no such thing as a guidehook to Germany, France, or Spain, other than such books as Howell's Instructions for Forreine Travell (1642) and its successors. The only works deserving the name of guidehook were J. C. Ebel's Anleitung for Switzerland (Zurich, 1793; 8th ed. 1843); William Boyce's Belgian Traveller (1815); and Mrs Mariane Starke's Directions for Travellers in Italy (1820). In the long series of his guidehooks Murray had the assistance of many notable authors—of Richard Ford for Spain, Sir Gardner Wilkinson for Egypt, Sir F. Palgrave for North Italy, Dr Porter for Palestine, &c. Murray's guidehook served as the foundation for the first of Baedeker's, the German guide to Holland and Belgium, and these in their turn inspired those of Baddeley and others. Most of Baedeker's numerons guidebooks are translated into English, and are as well known as Murray's even to English travellers. Other well-known series of guidebooks are those of Appleton and A. & C. Blaek. For France, the most accepted anthorities are the guides of Joanne; for Italy the (German) guide of Gsell Fels is admirable; for Norway Tansberg's (in English) deserves to be mentioned. Countless guides bave been written for all places of special interest both in England and the Continent. An admirable series of short practical books intended to embrace all the English countries is that of the Tourist Guides published by Edward Stanford. The most illustrious writer who has written a guidebook is Wordsworth, whose Guide to the English Lakes, written for Wilkinson's Select Views in 1810, was printed separately in 1822.

Guides, in military affairs, are usually persons drawn from the country in which an army is operating, one or more being sont with every detachment of troops. A guide should be intelligent, quick of eye, experienced in the topography of the country, and, above all, faithful. As, however, guides must on usany occasions be drawn from a bostile population, and have probably only a pecuniary interest in serving well, their conduct is always watched with the utmost jealousy, death being awarded as the punishment for the least departure from trustworthiness, since treason or incompetence might involve the most disastrons consequences to the whole expedition. In the French army a considerable corps of cavalry and infantry bear the name, but the name only, of 'guides.' They were first formed in 1744 as a small company of messengers on active service. The number was gradually increased mtil the time of Napoleon I., who formed them into a guard 10,000 strong. In the British Indian army the corps of guides of the Punjab Frontier Force (six treeps of cavalry and eight companies of infantry) have acquired the name in a similar manner.

Guidi, Carlo Alessandro, an Italian lyric poet, was born at Pavia in 1650, and died in 1712. He was one of the founders of the academy called L'Arcadia.

Guido. Guido Reni, a celebrated painter of the school of Balogna, was horn near that city, at Calvenzano, an 4th Navember 1575. He studied under Calvenert, and at the age of about twenty entered the school of the Caracci, of which he and Domenichino were the most famous pupils. He is also stated to have learned the processes of fresea from Ferrantini. His earliest works, of which the 'Coronation of the Virgin,' in the National Gallery, Londan, is an example, are marred by rather harsh and violent colonring; but coming under the influence of Caravaggio, he adopted many of the qualities of his art, and his

following works are characterised by forcible if exaggerated chiaroscuro. About 1596 he settled in Rome, where he worked for some twenty years, adopting a graceful style, of which the famous 'Amora and the Hours,' painted on the eciling of the pavilion of the Rospigliosi Palace, is a typical example. This is usually regarded as the masternice of the artist, but some competent critics rank even higher the unfinished 'Nativity,' in the choir of San Martino at Naples. The portrait titled 'Beatrice Cenci' (4.v.) in the Barberini Palace, Rome, is ascribed to Guido on very doubtful authority. He now entered upon the third period of his art, when he painted thinly, with great ease of execution and a cold silvery delicacy of colonring; but gradually his productions lost the vigour of his earlier time, when he had been more directly inspired by nature instead of by the study of Raplacel and of such examples of the antique as the Niobe group. The decline of his art is also attributable to his extravagant habits and his passion for gambling, which obliged him to paint under pressure for the dealers, and to produce much hasty and ill-considered work. On account of a quarrel with the Cardinal Spinola regarding an altarpiece commissioned for St Peter's he left Rome and settled at Bologna, where he died 18th August 1642. He was a most prolific painter, and his works are to be found in all the chief European galleries. At the beginning of the 19th century they were very highly esteemed, but now—in commen with the works of other post-Raphaelite Italian masters—they are less highly valued than formerly. In addition to his paintings Guido produced some vigorous and freely-touched ctchings, including a portrait of Paul V. and several religious subjects after his own paintings and those of the Caracei. He had many pupils both at Rome and Bologna. Of these the most celebrated was Simone Cantarini, known as Il Pesarese, who painted an excellent portrait of his master, now in the Bologna Callery.

Guido Arctinus, or Guy of Arrzzo, se called from his birthplace, was born about 900, became a Benedictine monk, and was still alive in 1067. He exercised much iullnence on the promotion of musical studies, and almost every discovery made in music for 150 years has been attributed to him, including that of descant, counterpoint, and absurdly enough) the spinet. It seems, however, that it was he who first adopted as names for the notes of the scale the initial syllables, set to regularly ascending tones, of the hemistichs of a hymn in honour of St John the Baptist (ut, re, mi, &c.). Mr Rockstro holds it certain that he invented the principle on which the construction of the stave is based, and probable that he invented the hexachord, solmisation, and the 'Harmonic or Guidonian Hand,' a mnemonic method of indicating the order of the musical sounds on the finger-joints of the left hand. The fame of Guido's musical invention drew upon him the attention of the papes Benedict VIII, and John XIX., who invited him to Rome. Guido left writings explanatory of his musical doctrines, especially the Micrologus and the Antiphonarium. See monographs by Angeloni (1811), Kiesewetter (1844), and Falchi (1882); Rockstro in the appendix to Crove's Dictionary (1889); and the articles Music, Solfficer.

Gnienne, one of the old French provinces, comprehending the present departments of Givonde, Lat, Dordogne, Aveyron, with portions of Taract-Garonne and Lot-et-Garonne. It formed with Gascony (q.v.) what was originally the country of Aquitama (q.v.), of which name Gnienne is a corruption.

Guignes, JOSEPH DE, born at Pontoise, 19th October 1721, acquired a great reputation as an October 1721, acquired a great reputation as an orientalist, and, chiefly on account of his thorough knowledge of Chincse, was appointed interpreter of oriental languages in the Bibliothèque du Roi. He died in Paris, 19th March 1800. His great work, L'Histoire Générale des Huns, Turcs, Mogols, et autres Tartares oecidentaux (1756-58), is a rare example of inclustry and research.—His son, CHRETIEN-LOUIS-JOSEPH (1759-1845), was also a very distinguished oriental scholar, and published of Chinese Distinguest (1813) a Chinese Dictionary (1813).

Guilandina, a genus of shrubs of the natural order Leguminosie, sub-order Cæsalpineæ. G. bonduc and G. bonducella are the best-known species. Both are natives of the warm parts of the East Indies, Arabia, Africa, and South America. Egyptian mothers string the seeds of both species and hang them round the neeks of their children, to guard them from evil influences and sorcery. The latter species is also called Nicker Tree and Swell Boards. Paines about the rise and there of Small Bonduc. Being about the size and shape of marbles, the seeds are often used as such by boys. The shell is remarkable for its flinty hardness. The kernel is very bitter. Ground to powder and mixed with black pepper, it is administered in India in ague; mixed also with castor-oil it is applied externally in hydrocele. The roots in Amboyna are considered to be a good tonic. The seeds are often thrown ashore on the coasts of Scotland and Ireland, and are sometimes called Molucca Beans.

Guildford, the county town of Smiey, lies in a break of the chalk ridge of the North Downs, on the navigable Wey, 30 miles SW. of London. In Cablett's phrase a 'happy-looking' place, it wears an air of order and cleanliness, and mainly consists of one street, running up the steep east side of the river, which here is crossed by an old five-arch bridge. Its houses are still rich in quaint cables, projecting fronts, and long lettical windows. The square Norman keep of its royal castle (circa 1150) is 70 feet high with walls 10 feet thick; on St Catharine's Hill is a ruined chapel (1313); Trinity Hospital, founded in 1619 by Archbishop Albot (q.v.) for twelve brethron and eight sisters, is a picturesque red-brick pile; and other buildings are the churches of St Nicholas, St Mary, and the Holy Triuity, the guildhall (1687), county hall (1862), county hospital (1868), and grammar-school (1862), county hospital (1868), and grammar-school (1509-50). A railway junction of some importance, Guildford now is chiefly famons for its grain market, the 'Surrey wheats' being eelebrated. From Edward I.'s reign till 1867 it returned two members to parliament, then till 1885 one. Since 1874 it has been the seat of a bishopric suffragan to Winelester. Pop. (1851) 6740; (1881) 10,858. Bequeathed in 901 by Alfred the Great to his nephew Ethelwald, Guildford in 1036 was the scene of the decination by King Handd's men of the Norman followers of Alfred the Atheling—a crime that led up to the Norman conquest of finecrime that led up to the Norman conquest of England. The Dauphin Louis took the eastle in 1210; and in 1685 Monmouth was temporarily confined in Trinity Hospital.

Guildhall, a building in London, the place of assembly of several courts, and the scene of the civic banquets of the city corporation, was originally built in 1411, but almost wholly destroyed by the great fire of 1666. It was rebuilt in 1789 in its modern form. Sec LONDON.

Guilds were associations which grew up and flourished chiefly among the commorcial and industrial classes during the middle ages. The word is derived from A.S. gild (Dutch gild, Ger. gilde) 'a payment;' the idea of payment may therefore be assumed to be the prominent original

feature of the association. The letter u in the English spelling of the word, it may be added, is superfluous, gild being the correct form. The full meaning of the word was unfolded only in the course of the history of the institution.

It is one of the many debateable points connected with the guilds, whether and how far the medieval institution was preceded and influenced by similar societies in Greek and Roman times. In the cranoi and thiasoi of the Greeks, and still more in erano and thiaso of the Greeks, and still more in the collegia opificum of the Romans, many writers find a resemblance to the guilds. The whole matter is obscure, the historical evidence being scanty and doubtful. As the ancient economy rested on slavery, and guilds were the voluntary organisation of the industrial classes, such associations could not have been very widely diffused in nons could not have been very widely diffused in the ancient world, if they existed at all. The probability is that the trade corporations of the later Roman period, though very different from the guilds, may have affected the early development of the latter. But the real origin of the guilds must be sought in the needs and circumstances of the time when they devicted. the time when they flourished.

The guilds known to history were an organisa-tion of the commercial and industrial classes, determined by the conomic, social, and political conditions prevalent during the middle ages. The most important of these conditions were the growth of freedom in the towns as opposed to the slavery of older times and the still existing serfdom of the country, the prevalence of a small industry operating for the most part in strictly defined local limits, and the absence of strong central governments. They were free local associations of the industrial classes for the promotion of their common interests at a time when central governments did not exist or were too weak to perform all the

functions of government as now recognised.

As the cities, and the free life associated with them, arose but slowly in the Teutonic settlements after the wreck of the Roman empire, the guilds had at first a very gradual growth. The first mention of an institution so called occurs in England in the laws of Ina (7th century) and Alfred. We hear of it first on the Continent in the time of Charlemagne in 779. By the middle of the 9th century guilds were widely diffused throughout the Frankish empire. In the 11th century they began extensively to flourish in the countries settled by the Tentonic peoples; and they were powerful also in France and Italy, where the Tentonic influence had been only partially felt. In the 14th and 15th centuries the institution reached its culminating point. after the wreck of the Roman empire, the guilds

reached its culminating point.

Guilds were an historical institution varying with the times and with the needs and aims of with the times and with the needs and aims of their members; and it would therefore be misleading to attach too definite a meaning to the word. In some of them doubtless the distinctive features were periodic festivals defrayed by the contributions of the members. These were the social gnilds. As during the middle ages the distinction between religious and according to the contributions of the members. social gnilds. As during the middle ages the distinction between religious and secular was not so strongly marked as now, all the guilds had more or less of a religious cast. Many of them, however, had a distinctly and exclusively religious purpose, and are therefore specially called religious guilds. But the earliest great example of the historic guild was the gilda merchant. In the evolution of town life during the middle ages the commercial class was the first to assert itself. It does not fall within the scope of this article to explain the conditions under which the medieval towns arose; and we need hardly state that as the towns grew, the necessity for intercourse among themselves and with the sur-Within rounding country regions was soon felt.

the towns the advance of civilisation brought with it a uniltitude of crafts, the workmen in which organised themselves into the eraft guilds. In many cases the guild organisation was identical with or grew into the government of the towns. But as the merchant guilds were first in the field, and moreover as the great merchants were fic-quently also the local landholders, the merchant gnilds claimed and for a long time maintained a privileged position. Hence herce and bitter struggles between the merchant and craft gnilds, which after continuing for many generations ended on the whole in favour of the latter towards the end of the 14th century.

From what has been said it will be evident that the guilds had a far wider scope than the trades-nnions of the present time. The distinction between labour and capital did not then exist; the guilds were an organisation of the whole industrial class, and they were associated with the business of local and civic self government in the widest sense of the word. They were most powerful on the Continent, especially in the towns of Flanders and south Germany, where the civic life was strongest and the central government particularly weak; there the guild struggles, especially the struggle of the craft against the morehant guilds, were longht out most vigocously. In England, where after the Norman Conquest there had been a comparatively strong central power, the guilds found less scope for independent activity in that way.

The inner organisation of the guilds rested on the arrangement of the workers into master, journeymen, and apprentice. The right to the indeneyman, and apprentice. The right to the inte-pendent exercise of a trade depended on being member of a gnild, and gnild membership carried with it the privileges of citizenship. On the one hand, the gnild had its own particular branch of industry reserved to it and a local market for its produce secured; on the other hand, the gnild had to see that its members possessed the due qualifications, moral and technical, and that the work they turned out was of fair and reasonable quality. In other words the interests of producers and consumers were supposed to be reconciled an equitable terms. Those objects could be attained, and the guild organisation generally could be maintained only by a system of regulations, which were often very minute, and yet were not sufficient to prevent continual disputes between the various crafts, the whole the guild organisation was best adapted to a stable condition of industry and of society.

The causes of the decline and fall of guilds have

not yet been thoroughly investigated, but the main reason may be found in the fact that they became stagment and did not adapt thomselves to the conditions of modern progress. As they had grown up and flourished under medieval conditions, so they began to decay under the new influences which overthrew the medieval system. Under the centralised governments which rose on the rnins of fendalism, and during the great wars waged by them in the 16th and 17th centuries, the free civic life of Flanders and Germany was crushed out. England the central power represented by Henry VIII. gave a severe blow to the guilds by confiscating their property on the plen that it was used for purposes of superstition; only the London corporations redeemed their funds by paying a fine of £18,700. The mercantile system was best adapted to such governments, and the guild organisation had to conform to the new system. Strong governments like France and Prussia regulated the guild organisation in the interest of the central power as then understood, the result being to deprive the members of free initiative and to make their constitution more rigid than over. Above all, it was the great industry of more recent times which finally broke

up and superseded the guild industry. This may be best illustrated by the early history of the steamengine, which was at once the originating cause and the embodiment of the industrial revolution that made guilds a thing of the past. Because of the opposition of the trade-guilds of Glasgow, James Watt could pursue his experiments only within the limits of the university there. The skill, energy, and cutciprise which produced the first effective steam-engine under Watt's initiative, were found at Bunningham, a town where trade connections did not exist. These facts are typical corporations did not exist. These facts are typical of the whole movement. Guild restrictions, whether or the whole movement. Guild restrictions, whether imposed by themselves or by strong central authority, were not consistent with the new industry, for which freedom was a prime necessity. This was at length recognised in the legislation of the most advanced countries of Europe. After a partially successful attempt by Turgot in 1776, trade corporations were entirely abolished in France at the condition of 1789. All consistents of the condition of 1789. revolution of 1789. All special industrial privileges enjoyed by guilds or corporations in England were removed by the municipal Reform Act of 1835. The North German Industrial Code of 1860 had the same effect in Germany. Thus the guild organisation, which during the middle ages realised the ideals of freedom, progress, and equity in such measure as was attainable by the men of that time, had become opposed to the wider claims of freedom, progress, and equity as now understood, and had to be swept

The name of guild has recently been revived in connection with associations for various social purposes, self improvement, &c. These we need not say are entirely different from the old guilds, to which this name were better restricted. The cooperative society is the only institution existing in the western world that really corresponds to the historic guild. The London livery companies still continue, but they have lost the substantial characteristics of the organisations of which they are a survival and relic. Recent investigation, however, has shown that guilds have long flourished very extensively in China. The castes of India in many respects perform the same functions, industrial and social, as the medieval guild.

See the articles Co-operation, Thades-unions, City, Componation, Hanshard League, & The whole subject of guild, has not yet been sufficiently investigated, and in some important cases the materials for such investiand in some important cases the materials for such investigation no longer exist. Most of the documents relating to the guilds of Paris, for example, were destroyed during the revolutionary period of 1789. See L. Brentano, On the History and Development of Edds, first published as preface to English Hilds by Lacy Toulinin Smith (1870), and appearing later as introduction to the same writer's Arbiteryllular der Gegenwert (1871); the same writer's Arbitergilden der Gegarwart (1871); Ochenowski, England's Wirthschaftliche Entwichtung mansgange des Militaliters (1879); Dr. C. Gross, The Gidd Merchant: a Contribution to English Municipal History (2 vols. 1890); article 'Gewerbe,' by G. Schonberg's Handbook of Political Economy (2d. 1886); E. Bain, Merchant and Graft Guids of Abridea (1887); and Walford, Gids: their Origin and Constitution (2d. ed. 1889). For the earlier period of English guids, W. J. Ashley's Introduction to English Economic History and Theory (1888) may be particularly recommended.

Guillemin, AMADÉE VICTOR, a popular writer on science, was born in Sanne-et-Loue, 5th July 1826, and became a professor of Mathematics at Of his numerous illustrated works many have been translated into English, including The Heavens (1896), The Sun (1869), The World of Comets (1876), and The Forces of Nature (1872) and Application of Physical Forces (1877), the last two by Mrs Norman Lockyer. Both in France and England Chillennin's works have gone through many editions many editions.

Guillemot (Uria), a genus of diving birds of the Ank family (Alcidæ), represented by eight species in the arctic and north temperate zones. The bill is moderately long, straight, and feathered to the nostrils; the feet are three-toed, the hind-



toe being absent, and they are completely webhed. The wings and tail are short, and the legs are placed very far back, so that the bird stands erect. Its walk is awkwaid, and its flight heavy though well sustained; but it dives with great agility, using its halfopened wings to aid its progress. The its progress. The guillemots breed in largecolonieson tocky eliffs, building no nests,

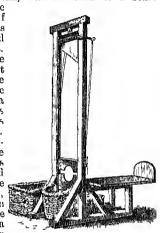
Common Guillemot (Uria troile), their eggs on the bare

shares with the female the labour of hatching Their food consists of ies. The Common or, and rearing the young. The crustaceans and small fishes. as it is often called, Foolish Guillenot (*U. troile*), is very abundant on the British coasts. In summer the head, neck, and upper parts of the body are of a dark brown, the under parts white, the bill, leg-, and feet black; in winter the neck and some parts of the head are white or mottled brown and white. The male measures about 18 brown and white. The male measures about 18 inches in length; the female is coloured like the male, but is slightly smaller. She lays only one egg, 3 inches in length, which she hatches by holding it between her legs as she sits erect facing the cliff. The eggs are pear-shaped, and vary in colour from pale green to a deep reddish-brown. It seems, however, as if one bird laid the same colour of ogg in suggestive sequents. The Rimord (buillemot is in successive seasons. The Ringed Guillemot is sometimes considered as a distinct species (U. ringvia), but as it differs from the common guillemot only in having round the eyes a ring of white continued backwards as a fine line, and as it is never found except where the latter also occurs, most ornithologists now agree in regarding it as a variety. The Black Guillemot (*U. grylle*)—sometimes placed in a separate germs (Cepplus)—is found in Caithness and on the west coast of Scot-Orkney, and Shetland. It is smaller than the preceding species, its length being only 14 inches, and it differs from it in laying two eggs. Its summer plumage is sooty black, with the exception of white patches on the wing-coverts; and in winter the head and back have white markings, and the under parts are nearly white. In America grylle breeds as far south as the Bay of Fundy; In America U. troile is occasionally found on the coasts of New York. Where guillenots congregate in vast numbers, as at Flamborough Head, scaling the elits in scarch of their eggs is a regular profession, and one which requires much skill and courage. The eggs are occasionally used as food, as is also, indeed, the coarse flesh of the bird itself; but they are chiefly valued for their albumen, of which it is said large quantities are used in clarifying wine and in the ineparation of patent leather. See Howard Saunders, Manual of British Birds.

Guillim, JOHN, heraldic writer, born in Herefordshire, about 1565, was most of his life an official of the College of Arms in London. In 1610 he published *The Display of Heraldry*, the materials for which, however, were supplied by John Barkham (c. 1572-1642), chaplain to the Archbishop of Canterbury. Guillim died 7th May 1621.

Guillotine, the instrument of decapitation introduced during the French Revolution by the Convention, and named after its supposed inventor, Joseph Ignace Guillotin, a physician (bonn 1738—died in his bed, not, as often said, by his own instrument, 1814), who, however, was only the person who first proposed its adoption. It was elected and first employed to execute a highwayman on the Place de Grève, Paris, 25th April 1792. It is composed of two upright posts, grooved on the inside, and connected at the top by a cross-beam. In these grooves a sharp iron blade, having its edge ent obliquely, descends by its own weight on the neek of the victim, who is bound to a board laid below. The

invention machines of this kind is ascribed to the Persians. In Italy, from the 13th century, it was the privilege of the nobles to be put to death by a machine of this kind, which was called mannaia. An instrument resembling the guillotine likewise cumployed during the middle ages in Germany, where it has been reintroduced since 1853, and at a



France and Holland. During the leth and 17th centuries a machine called the Maiden, which differed but slightly from the guillotine, was employed in Scotland for the pmpose of decapitation; among its victims were one of Rizzio's murderers (1566), the Regent Mortou (1581), and the Marquis (1661) and the Earl of Argyll (1685). Morton is company, but falcars as id to have introduced its monly, but falsely, said to have introduced it, taking the idea from the similar engine at taking the idea from the similar engine at Halifax (q.v.), which was in use till 1650. See J. W. Choker, History of the Guillotine (1853); L'Abbé Bloeme, Notice sur la Guillotine (1865); Chereau, Guillotin et la Guillotine (1871); and Dubois, Récherches historiques et physiologiques sur la Guillotine (1881).—The name of guillotine is also given to a powerful machine used by bookbinders for cutting paper and cropping the edges of books, the blade having an oblique motion.

Guilty. See Criminal Law.

Guimarães, an ancient and picture-que walled town of Portugal, on the Ave, 12 miles SE. of Braga. Here is the 14th-centmy Oliveira Chmeh, and there are two noted hot sulphur-springs in the vicinity. Pop. about 8205.

Guinea, the name of a large section of the west coast of Africa, which first came into general use in the 15th century. Although the name is used with a different extension by different writers, it is pretty generally agreed that the stretch of coast-lands so designated extends from the month of the Senegal, in about 14° N. lat., to Cape Negro, in 16° S. lat. By conventional usage it is further divided into two parts, Upper and Lower Guinea, the dividing line being taken variously as the equator, the Gaboon, the Ogoway. The states and political territories comprised within this long

stretch of coast-line, commencing from the north, are as follows: the French colony of Senegal, the English settlements on the Gambia, the Portuguese tenitory of Bissão or Bissãos, the coastal fringe before Futa-Jallon, Sierra Leone (British), the free negro republic of Liberia, the Ivory and Gold Coasts (shared between France and Britain), the Slave Coast (belonging to Germany, Britain, and Dahomey), the Niger delta (falling within the British sphere of commercial interest), and the Cameroons (German) in Upper Guinea; and in Lower Guinea, the Spanish settlements on Coisco Bay, the French colony of the Gaboon, the Cougo Free State, and the Portuguese territories of Ambriz, Angola, and Benguela. The coast-line is throughout tolerably uniform, and everywhere flat, with unmerous shallow lagoous separated from the ceant by narrow spits of sand, lying parallel to the coast. Proceeding inland, the country rises to the central plateau of the continent by a series of broad terrace-like steps, down which the longer rivers are generally precipitated in extaracts and rapids. The Gonose claim to have been the first European navigators to reach (in 1291) the coasts of Gninea. They were, however, first regularly visited by merchant adventurers from Rouen and Dieppe from 1364 onwards, but not calonised until the end of the 15th century, when the Portuguese, under the enterprising Prince Henry the Navigator, sent out (1481) the first calonies to this part of the divisions of Gninea.—Gold Coast, &c.

Guinea, a gold coin current in Great Britain from 1664 down to 1817, when it was superseded by the Sovereign (q.v.). It derived its name from the fact that the gold from which the first specimens were coined was brought from the Guinea coast in West Africa. Its value varied considerably at



Guinea of Charles II.

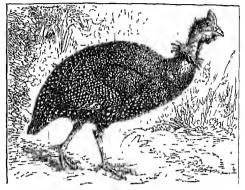
different periods, but was latterly fixed at twenty-one shillings. It is still customary in Great Britain to estimate professional fees, honoraria of all kinds, complimentary subscriptions, prices of pictures, race-horses, &c. in guineas. In 'spade guineas' the reverse bears a spade-shaped shield with the royal arms.

Guinea, Gulff of, a portion of the Atlantic Ocean, forming the huge angle of the West African coast, stretches from Cape Palmas, in 7° 44′ W. long., to Cape Lopez, about 1° S. lat. At its northeast extremity is the delta of the Niger, between the Bight of Benin on the north-west and the Bight of Biafra on the south-east. Along its east side are the islands of Fernando Po, Prince, and St Thomas.

Guinea Corn, a name sometimes given to Durra (q.v.); sometimes to another cereal grass, Penicillaria spicata or Pennisetum typhoideum, very extensively cultivated in central Africa, and to some extent also in India, where it is called Bagree. It is of the tribe Panicex, and may be regarded as one of the millets. It is a grass with a spike-like cylindrical paniele.

Guinca Fowl (Numida), a genus of African birds in the Pheasant family (Phasianidae). The

plumage is dark gray, with round spots of white, generally larger on the back and under surface. Some species are adoined on the head with a helmet or honry easque, while others have fleshy wattles on the cheeks and a tuft or top-knot on the crown. The genns is represented by nine species, in the Ethiopian region—east to Madagascar, south to Natal. The lest known is the Common Guinea Fowl or Pintado (N. meleagris), also popularly



Common Gumea Fowl (Numida melcagris).

known as 'Come-back,' from its cry, with naked head, hard callons casque, and slate-coloured plumage, everywhere speckled with round white spots of various sizes. It is common in Guinea and southwards to the Cape of Good Hope. It is found also in more northern parts of Africa, and was known to the ancient Romans, by whom it was called Meleagris and Gallina Numidica, and highly prized. In their wild state the birds occur in flocks, sometimes of fifty to sixty, and are extremely shy and difficult to approach. They utter a frequent, harsh, and querulons cry. They are not so polygamous as many of the gallinaecous birds, and even in domestication show a tondency to pair. The guinea fowl is now common in the poultry-yards of most parts of Europe, although it is more adapted to warm than to cold climates, and in Jamaica has been completely naturalised, so as to be destructive to crops and to be shat like other game. In Britain the young are rather troublesome to roar, but both birds and eggs command high prices in the market. The eggs are small, and lave a thick, strong shell, but are particularly esteemed. The flesh is somewhat like a pheasant's, but rather dry. Grinea fowls, however, are troublesome in a poultry-yard, from the disposition of the males to attack and tyramise over other poultry.

Guinea Grass (Panicum maximum), a grass of the same genns with Millet (q.v.), a native of Guinea and Senegal, but introduced at an early period to the West Indies, where it is extensively cultivated, and by the abundance and excellence of its forage forms most important pasture. Other species of the same genns are among the most useful pasture and forage grasses of tropical countries.

Gninea Pepper, a name which has been variously applied to the seeds or dried fruit of several very different plants, agreeing in their peppory character, and in being the produce of the west of Africa. The name Malaguetta (Malagheta, Meleguetta, &c.) Pepper is generally to be regarded as equivalent with Gninea Pepper, and is at present a frequent designation of Grains of Paradise (q.v.); but the capsules or dry berries of Capsicum fruitscens (see Capsicum) are commonly but erroneously

sold by druggists under the name Guinea Pepper: whilst the names Guinea Pepper, Malagnetta Pepper, and Ethiopian Pepper have been applied to the dried fruit of Cubeba Clusii (see Cubebs), and to the seeds of Habzelia (or Xylopia) Æthiopica, a shrub of the natural order Anonaceae. Up to the close of the 18th century Guinea Pepper continued in request, when the peppers of the East drove it from the market.

Guinea-pig, or CAVY (Cavia), a genus of small South American rodents, widely represented in Britain by the familiar domesticated species. The genus, comprising nine species, is typical of the family Caviidæ (included in the porcupine-like section of Rodents), and is nearly related to the largest member of the order—the Capphara or Hydrochærus. The guinea-pigs have short limbs, the fore-feet bearing four toes, the hind-feet only three; the fore-feet are not wellbed; the numer lim is not fore-feet bearing four toes, the hind-feet only three; the fore-feet are not webbed; the upper lip is not eleft, the ears are short and rounded, and the tails are wanting. The Common Guinea-pig or Cavy (C. cobaya)—whose name Guinea is believed to be a corruption of Guiana—was introduced into Enrope from South America in the 16th century. Its supposed wild original, the Restless Cavy (C. aperca), abounds on the banks of the La Plata,



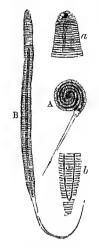
Guinea-pig.

and is found in Bolivia and Brazil. Its colour is dark brown on the back and yellowish-gray underneath. It lives in small troops near the borders of forests, whence it energes at dusk and on gloomy days in search of food. It is timid and stupid, and falls an easy prey to carnivores and serpents. The common guinea-pig resembles it closely in nearly all points except colour, which is very variable, as in other domesticated animals. The guinea-pig multiplies with great rapidity, and may begin to bear young when two months old, producing one to four at a hirth, five or six times a year. The other species occur from the Strait of Magellan to Brazil, and one is found in Peru. Although now exclusively South American, fossil forms are said to have been found in the Miocene deposits of Switzerland and France. Some species of Cavia Switzerland and France. Some species of Cavia are shot for food, but no such use is made of the domesticated form.

Guinea-worm, known also as Filaria Medinensis, or F. Drucunculus, is a parasitic animal that seems to have been known from the earliest times. Plutarch quotes a passage from a still earlier anthor which seems clearly to refer to this worm. But our knowledge of its natural history is still very deficient, and we are at present only acquainted with the female. The body of this animal is slender, cylindrical, and somewhat compressed, and is of the thickness of pack-thread, except at the posterior extremity, where it is somewhat attenuated. It is opaque, of a milk-white colour; on each side there is a longitudinal line; and when examined by the microscope it is seen to be marked with unmerons transverse striæ. anterior extremity is obtuse and the mouth circular and beset with four acute spines. The length of the worm varies from less than half a foot to three yards. On examining an adult specimen, extracted by Malgaigne in Paris in 1854, Robin

found no trace of intestine, or of any organ except a very thin sheath (a uterus or "ovidnet), which was filled with young animals tolled up in coils, with the tail occasionally projecting outwards (see A in the figure). In these young animals we can trace the course of the intestinal canal, which apparently becomes subsequently ob-literated by the excessive development of the generative organs and the eggs.
This worm is indigenous

only in certain hot countries, and its geographical distribution is regulated by laws into which we have no insight, save that heat and moisture are necessary for its production. Among places as especially notoious for its occurrence are Young Filaria Medinensis south to occurrence are Senegal, Gaboon, the banks of the Ganges, Bombay, the peninsula of India, Persia, Arabia Petræa, the south coast of the Red Sea, the region round the Caspian Sea, Upper Egypt, Alwesinia certain districts Abyssinia, certain districts



(magnified):

A, individual coiled up, as seen in the body of its patent; B, the same uncoiled in a drop of water; a, the head; b, the commencement of the tail and the part.

of Nubia, the swampy regions of the White Nile, and Guinea. It has been introduced into certain parts of America by negro slaves. The disorder occasioned by these worms frequently becomes an occasioned by these worms frequently becomes an epidemic in years of heavy rain, and especially in marshy districts. It appears also to be connected with the season, being especially prevalent in the East Indies during the rainy season, and in Upper Egypt shortly after the regular inundation of the Nile.

The mode of production of this parasite in the luman body is not known with certainty. The probability is that the young animals while still very minute penetrate the skin, although by what mechanism they can effect their lodgment we do not know. Having gained an entrance into the best the crime way to be the state. the body, the guinea-worm takes a considerable time to develop. This period varies from two months to a year or even two years. The presence of the worm often produces no annoyance for a considerable time after it has been detected; at other times it gives rise to emaciation, and possibly even death from exhaustion. As a general rule even death from exhaustion. As a general rule the vesicles caused by the inflammation excited by the presence of the worm open spontaneously in a few days, and two or three inches of the anterior end of the animal come forth. This end is gently pulled, and coiled round a little roll of linen or a small stick, and this is fastened over the wound with sticking-plaster and a compress. The extraction is repeated twice a day by rotating the substance round which the worm is twisted, and the operation is often not completed in less than two, three, or more months. From the most ancient times the tearing of the worm has been regarded as a very dangerous accident. It undoubtedly gives rise to violent swelling, fever, sleeplessness; and shortening and deformities of the legs, lingering fistula, mortification, and death (sometimes even sudden death) must be reckoned amongst the notable consequences of breaking the worm. See Quain's Dictionary of Medicine;

Linn. Trans. (1863); also the writings of Owen, Cobbold, and Bastian.

Guinegate, a village of Hainault, Belgium, where the French were twice defeated. (1) On 17th August 1479 they were beaten by Maximilian I. of Austria; (2) on 16th August 1513 by Henry VIII. and the Emperor Maximilian. This battle was called the Battle of the Spurs—the French knights having made more use of their spurs than of their swords.

Guinevere. See ARTHUR.

Gningamp, a town in the French department of Côtes-du-Nord, on the Trieux, 74 miles E. of Brest, was formerly the capital of the duchy of Penthièvre. It has a college, a thread-factory, and some pottery-works. The name gave rise to the word Gingham (q.v.), Pop. 8744.

Guinness, Sir Benjamin Lee, Bart., boin 1st November 1798, was a member of the great brew-ing firm in Dublin established by Arthur Guinness in 1759. The business, the largest of the kind in the world, was made a limited liability company in the world, was made a finited fability company in 1886, with a capital of £6,000,000, employs nearly 3000 persons, and its premises cover 42 acres. Sir Arthur restored the cathedral of St Patrick in Dublin at his own cost (£140,000) and under his own personal superintendence. He was M.P. for Dublin from 1865 to 1868, and in 1867 was created a baronet. He died 19th May 1868.—His third son, Sir Edward Cecil Guinness, born 10th November 1847, and created a baronet in 1885, placed in the hands of responsible trustees in 1889 the sum of £250,000, to be spent in providing sanitary dwellings for workmen at a low rent, £200,000 to be given to London and the rest to Dublin. The income derived from the use of the capital sum is to be devoted to the same purpose.

Guipuzcoa, the smallest but the most densely peopled of the Basque provinces on the Bay of Biseay. The mountains are wooded, the climate good, minerals are largely produced, and there is a good deal of manufacturing industry—soap, pianos, carriages, carpets, iron, paper. The capital is San Sebastian. Area, 728 sq. m.; pop. (1887) 181,856.

For the people, see BASQUES.

Guisborough, a market town of the North Riding of Yorkshire, 9 miles by rail ESE, of Middlesborough, lies at the feet of the Cleveland Hills, in the midst of the iron-mining district. The earliest alum-works in England were established here about the year 1600. Here too are the remains of a priory built in 1119 by Robert de Brus, and at the time of the Reformation one of the wealthiest monastic institutions in the kingdom. Pop. (1851) 2062; (1881) 6616.

Guiscard, Robert, Duke of Apulia and Calabria, the sixth of the twelve sons of Tancred de Hauteville, was born near Contances in Normandy about 1015. Following in the wake of his elder brothers, he won great renown in south Italy as a soldier, and after the death of William and Humphrey was proclaimed Count of Apulia. Guiscard next captured Reggio and Cosenza (1060), and thus conquered Calabria, in the possession of which he was confirmed by Pope Nicholas II. Robert now became the pope's champion, and along with his younger brother Roger waged incessant war his younger brother Roger waged incessant war against Greeks and Saracens in south Italy and Sicily, both of which gradually fell under their arms, the latter being, however, given to Roger as count. The closing years of Robert's life were occupied in fighting against Alexius Commenus, whe had deposed Michael VII. from the throne of Constantinople, Robert being drawn into the quarrel from the fact that he had married his daughter to Michael's heir. Having sent his son Bohemond (a.v.) to reduce Corfu, he himself gained Bohemond (q.v.) to reduce Corfu, he himself gained

a brilliant victory over Alexius at Durazzo (1081), captured that city (1082), and then marched through Epirus towards Constantinople, when he received information that the Emperor Henry IV. had made an inroad into Italy. He immediately hastened back, compelled Henry to retreat, and liberated the pope, who was besieged in the eastle of St Angelo (1084). Then, having returned to Epirus, he defeated the Greeks in several engagements, took possession of some islands in the Archipelago, and was on the point of advancing a second time to Constantinople, when he died and denly in Cephalonia, 17th July 1085. See works on the Normans in Europe by A. H. Johnson (1877) and T. W. Barlow (1886).

Guise, a town of the Froneh department of Aisne, on the Oise, 25 miles by rail ENE. of St Quentin. Within the town are the ruins of a derived their title. Gnise is now a place of considerable industrial activity, with woellen and cetton manufactures, and a large foundry (800 hands) for manufacturing cooking and heating stoves. The ironworks are conducted on a profit-sharing scheme; and the workmen are provided with dwellings on the associated plan. This Fundistere, of which the first portion was erected by the initiof when the first porton was erected by the mutator of the experiment, M. Godin, in 1859-60, has cost about 480,000, and provides accommodation for 2000 persons. Within the buildings are a café, theatre, nursery, schools, covered playgrounds, a co-operative store, and a library and reading-room. Pop. (1872) 5651; (1886) 7665.

Guise, the name of a branch of the ducal family of Lorraine, which it derives from the town of Gnise, in the department of Aisne.

CLAUDE OF LORRAINE, first Duke of Unise, was the fifth son of René II., Duke of Lorraine, and was born at the château of Condé, Octeber 20, 1490. Attaching himself to Francis I., he feught with distinction at Marignano in 1515; but after that campaign remained at home to defend France against the English and Germans (1622–23). During the captivity of Francis I., after Pavia, Claude of Guise suppressed the pensant revolt in Lorraine (1527), for which Francis, after his return home, overled him Duric of United by his later ways has created him Duke of Guise. In his later years he held himself aloof from public life; he died 12th April 1550.

His daughter Mary, usually spoken of in history as Mary of Lorraine, was born November 22, 1515, and in 1538 became the wife of James V. of Seetland. By his death in 1542, she was left a widow with one child, Mary, Queen of Scots. Under the regency of Arran which followed, war broke ent be-Under the tween England and Scotland, partly on account of the claims which Henry VIII. made with regard to the infant Mary's marriage, and partly on religious grounds. Mary of Lorraine during those years acted with much wisdom and moderation; but after her own accession to the regency in 1554, she allowed the Guises too much to influence her policy, the result being that the Protestant nobles com-bined against her in 1559. This rebellion, which she was assisted by French troops to repress, continued almost to the time of her death, which took place in Edinburgh Castle, 10th June 1560. But before her death she was reconciled to her nobles.

Francis, second Duke of Guise, son of the first duke, was born at Bar, February 17, 1519, and became one of the greatest generals of France. At the siege of Boulogne (1545) he gained the nickname of Balafré from a severe wound in his face. Seven years later he held Metz gloriously against Charles V. of Germany, and thus prevented an invasion of France. He added to his reputation at Renti (1554), fighting against the troops of Charles V., and in 1556 took command of the expedition against Naples. Recalled thence in the following year to defend the northern frontier against the English, he took Calais (1558) and other towns, and brought about the treaty of Catean Cambresis (1559). He and his brother Charles, the cardinal (1525-74), probably the most capable man of the Guises, who afterwards played a prominent part at the Council of Trent, then managed to possess themselves of all real power during the reign of the weak King Francis II. Putting themselves at the head of the Roman Catholic opposition to the Reformation, they repressed Protestantism with a strong arm. In the war between Huguenots and Catholics Guise and Montmurency won a victory at Drenx (1562), and the former was besieging Orleans when he was assassinated by a Huguenot nobleman, on 18th February 1563. He had a taste for literature, and his memoirs, written by himself, have much historic interest. See his Life by Brisset (1840) and Canvin (1885).

HENRY I., third Dnke of Gnise, son of Francis, was born December 31, 1550. Filled by the murder of his father with bitter hatred of the Protestants, he fought fiercely against them, at Jarnac (March 1569) and Moncontour (October 1569), and in the same year forced Coligny to raise the siege of Poitiers. He was one of the contrivers of the massacre of St Bartholomew, August 24, 1572, in which he personally made sure that Coligny should be slain; and subsequently he put himself at the head of the Catholic Leagne. He had, however, a greater ambition, that of succeeding to the throne of France, for in respect of real power he was already the equal, or rather superior, of the feeble King Henry III., whose commands he set at naught and whom he so deeply huntilated that the king procured his assassination, on 23d December 1588, at Blais. This duke earned the nickname of Le Balafré ('of the scar') in an encounter with German mercenaries of Condé at Dormans (1575).

German increances of Conde at Dormans (1575). See his Life by Rémandl (1879).

HENRY II., fifth Duko of Guise, the grandson of Henry I., was born at Blois, April 4, 1614. He was destined for the church, and at the age of fifteen became Archbishop of Rheims, but, in 1640, on the death of his elder brother, he sneceeded ta the dukedom. Having joined the league against Richelicu, he was condemned by the parliament of Paris to capital punishment, but found refuge in Flanders. He put himself at the head of Masaniello's revolt in Naples, as the representative of the Anjou family, but was taken prisoner by the Spanish forces (1647) and carried to Madrid, where he remained five years. After another fruitless attempt to win Naples (1654), he settled at Paris and lived the life of a conrtier, dying in June 1664 without descendants. His Mémoires (2 vols. Paris, 1669) were written partly by Count Raymond of Modena and partly by his secretary, St Yon. The direct line of the house became extinct on the death of François Joseph (1674), the seventh duke, and grandson of Henry II.'s brother Louis. See Forneron, Les Ducs de Guise (2 vols. 1877).

Guitar (Lat. cithara, Gr. kithara, 'a lyre or lute'), a musical stringed instrument, somewhat like the lute, particularly well adapted for accompanying the human voice, and much esteemed in Spain and Italy. It was first introduced into the former country from the East by the Moors. It has six strings, the notation of which is as follows:



but which sound an octave lower; and the sound

is produced by the fingers of the right hand twitching the strings, while the fingers of the left hand make the notes of the music on the finger-loard, which has frets across it. The three highest strings of the guitar are always of gnt, and the three lowest are of silk spun over with silvered wire. The greatest virtuosi on the guitar have been Ginliani, Sor, Zocchi, Stoll, and Horetzsky.

Guizot, François Pierre Guillaume, historian and statesman, was born at Nîmes, October 4, 1787, of middle-class Huguenot parentage. His father, although a Liberal, was guillotined, April 8, 1794, whereupon his mother removed with him to Geneva. There he was carefully educated, being taught among other things the trade of a carpenter, in accordance probably with Ronssean's theories. In 1805 he went to Paris to study law. He soon drifted into literature; and it was a review of Chateanbriand's Martyrs (1809) that brought him under the notice of the dictator of Parisian literary society. In the same year appeared (inizot's Nouveau Dictionnaire des Synonymes, in 1811 an essay on the fine arts; and in 1812 the final literary bent of his mind showed itself in a translation of (filling). The same was the remainder of Gibbon. That same year he married the first of his three wives, Mdlle, de Menlan (1773-1827), editor of Le Publiciste, to which he had been a enter of Le Tuotteles, to which he had been a contributor. Shortly afterwards he was chosen professor of Modern History in the University of France. Guizot was, however, a decided opponent of the Napoleonie régime, and it was not till 1814, after its fall, that he became secretary-general of the ministry of the Interior. This office he exchanged after the Hundred Days for the secretary-general him of the ministry of Justice and in 1816. generalship of the ministry of Justice, and in 1816 for the general directorship of the departmental and communal administration, being at the same time made a councillor of state. As a doctrinaire or constitutional Liberal, he found himself out of sympathy with the reactionary policy of the Bourbons. So pronounced was his opposition that in bons. So pronounced was his opposition that in 1821 he was deprived of his public appointments, and four years later interdicted even from lecturing on history. He threw himself once again into literature. In conjunction with some friends he literature. published Memoires relatifs à l'Histoire de France jusqu'au 13me Siècle (31 vols.), and Mémoires relatifs à la Révolution d'Angleterre (26 vols.). He also edited translations of Shakespeare and Hallam, and commenced his Histoire de la Révolution and commenced the street and the according to the chair, he lectured on the history of civilisation in Europe, and more particularly in France. These lectures, published as Cours d'Histoire Moderne, finally established his reputation as one of the lirst historians of his day.

The time had now come for Gnizot to take a more active part in politics. In 1830 he was returned to the Chamber of Deputies for Lisieux, at once became a prominent member of the Opposition, and, although no orator, aided indirectly in bringing about the Revolution of July, which placed Louis-Philippe on the thrane. Minister first of the Interior, and subsequently of Public Instruction, he signalised his occupancy of the latter congenial office by establishing a system of primary schools throughout France, giving an impulse to secondary and university education, and reviving the Academie des Sciences Morales et Politiques. In 1840 Guizot, then temporarily in alliance with his leading parliamentary rival, Thiers, canno to Loudon as French ambassador, and was received with great respect, on account of his reputation and the interest he had shown in English history. But, unfortunately, at this time the relations between Great Britain and France were strained in consequence of the Syrian question, and Gnizot was, not quito accurately, looked npon by Melbourne

and Palmerston as the mouth-piece of the policy of Thiers. 'He was always,' in Melbourne's opinion, says Melbourne's biographer, 'what Talleyrand from the first pronounced him to be—un intrigant austère.' Fortunately for Guizot he did not hold the embassy long. Thiers's belligerent policy alarned Lonis-Philippe into virtually dismissing him. Guizot was summoned to take his place, and till the end of Louis-Philippe's reign was his chief adviser, although it was not till 1847 that he became prime-minister. In the early years of his term of power Guizot was undoubtedly successful; his chief aim, like his master's, peace.

When, after the fall of Peel, Palmerston once more obtained the control of British foreign policy,

When, after the fall of Peel, Palmerston once more obtained the control of British forcign policy, Guizot, by way of checkmating him, phinged into the intrigue which resulted in the 'Spanish Marriages.' This intrigue was totally indefensible, and the indecency of the central incident in it—the forcing of the young queen of Spain into a marriage with a disreputable and intellectually contemptible kinsman—revolted the conscience of Europo, and greatly injured Guizot's reputation. It alienated Franco from Great Britain, and compelled Guizot to fall back for sympathy on the reactionary forces in Europe, whose hope at this time was Austria. He also relapsed into reactionary methods of government at home, allowed the finances to drift into confusion, and resisted the rising demand for parliamentary reform; whilst, although personally pure, his administration became notorious for

scandalous jobs. With the fall of Louis-Philippe in February 1848 Guizot's active political career really came to an end. Ho escaped to London, where he was cordially recoived by old friends, and even by old oppo-nents like Palmorston. In the troubled period which preceded the establishment of the second empire Guizot made offorts both in London and Paris to rally and fuso the monarchical parties of France, but after the coup detat of December 2, 1851, he gave himself up entirely to literature. He completed his works on the Great Rebellion in England, under the titles of Révolution d'Angleterre and Monk, Chute de la République. He also published Cornelle et son Temps, and Shukspeare et son Temps in 1852; Mémoires pour servir à el Histoire de mon Temps—an explanation of, but certainly not an apology for his policy—in 1858; Mélanges Biographiques et Littéraires in 1868; and Mélanges Politiques et Historiques in 1869. His Vorrespondance, et Ecrits de Washington (1839-40) was commissioned by the United States government. Guizot took a keen interest in theogovernment. Guizot took a keen interest in theological and ethical speculation, and for a long time his voice was supreme in the consistery of the Protestant church in Paris. His exensions into other fields than those of history and politics bore fruit in Méditations et Études Morales (1852), and Méditations sur l'État actuel de la Religion Chrétienne (1865). His Histoire de France raconte à mes petits Enfants was completed and published by his daughter, Madame Guizot de Witt (5 vols. 1870-75). 1870-75).

Daring the second empire Guizot lived tranquilly in retirement, chiefly at his residence of Val Richer, near Lisieux, in Normandy. On Jannary 19, 1870, he made his first political appearance in public since 1848 by attending a reception given by the third Napoleon's 'Liberal' minister, M. Ollivier. Ho followed with a painful interest the fortunes of his country in the war with Germany. He approved of the conduct of the Government of National Defence in deciding to carry on war a outrance. In a letter to the Times on the subject, he mentioned the fact of his having four sons on the ramparts. The vectoran statesman survived for more than three years the greatest

humiliation his country had ever suffered, dying September 12, 1874.

That Guizot was a man of high personal character, that he led a simple life, and that he despised wealth are beyond doubt. He was a patriot also, according to his lights; if at one period he intrigued abroad and at another convived at corruption at home, he did it for the aggrandisement of his country, not for his own advantage. It must be admitted, however, that constitutional pedantry, obstinacy, and self-sufficiency prevented him from being a great, in the sense of an accommodating and fur-seeing politician. As a historian he was painstaking and, on the whole, accurate, but he was not brilliant. Altogether Guizot, though not a great man, was a large and important figure in the history of France and of his time.

The leading anthorities on the life of Guizot are his own Memoirs, and Guizot in Private Life, by his daughter, Madame de Witt (Eng. trans. 1880). For the sentiments entertained towards him by British statesmen who were his contemporaries, Mr Evelyn Ashley's Life of Viscount Palmerston (1870), Mr Torrens's Memoirs of Lord McLbourne (1878), and Mr Spencer Walpole's Life of Lord John Russell (1889) may be consulted with advantage.

Gujarat, or Guzerat, the northern maritime province of Bombay, in 20° to 24° 45′ N. lat. and 69° to 74° 20′ E. long., with a total area of over 70,038 sq. nn., and a pop. (1881) of 9,779,780, or more than one-half that of the entire presidency. Within its limits lie the British districts of Surat, Breach, Kaira, Pauch Mahals, and Ahmadabad, the territories of the Gaekwar of Baroda (q.v.), and numerous petty native states. Of these last 180 are on the peninsula of Kathiawar, which projects into the Arabian Sea to the north of the Gulf of Cambay; but the term Gujarat is sometimes used to exclude the peninsula. Gujarati is one of the seven main Aryan vernacular languages of India (q.v.). See also Gujarat.

Gujranwala, elief town of Gujranwala district, in the Punjab, 40 miles N. of Lahore, on the Northorn Punjab State Railway, lies in a flat plain, is notorious for its bad sanitary condition, and has some local trade and petty manufactures. It was for a time the capital of the Sikh power, and Ranjit Singh was born here. Pop. 22,884.—The district has an area of 2587 sq. m., and a pop. (1881) of 616,892, three-fourths Mohammedaus.

Gujrat, or GUZERAT, the chief town of Gujrat district, in the Punjab, has been left (by a change in the river's course) a few miles north of the present bed of the Chenab, but is a place of some military and political importance, as well as the centre of a considerable trade. It produces cloth and cotton goods, brass vessels and gold inhid-work, and boots and shoes. Here, in 1849, a decisive battle was fought, which finally broke the Sikh power, and brought the whole Punjab under British rule. Pop. 18,743.—The district has an area of 1973 sq. m., and a pop. (1881) of 689,115.—For another territory called GUJARAT, see under that heading.

Gulden. See FLORIN.

Gules (queules, the French heraldic term for 'red,' is the planal of queule, 'the month,' Latquila, the term by which the colour red is known in heraldry. See HERALDRY.

Gulf Stream and Oceanic Currents. The Gulf Stream is the best known, the best defined, and the most remarkable of all the ocean currents (see map at ATLANTIC). It derives its name from the Gulf of Mexico, out of which, as a great enrent of warm water, it flows through the Strait of Florida, along the eastern coast of the United States of America, and is then deflected near the banks of Newfoundland diagonally across

the Atlantic. This great body of warm water indirectly modifies the climate of western Europe, and it is possible to trace its effects as far as the coasts of Spitzbergen and Nova Zembla. It is essential in describing the Gulf Stream to take into consideration the general question of oceanic circulation, and the thermal conditions of the ocean made known from the explorations of the Challenger, Blake, and other recent expeditions.

The prevailing winds of the globe are determined by the distribution of atmospheric pressure, and the position of barometric maxima and minima are in turn determined by the distribution of land-masses and water-surfaces. The wind blows out of and around high-pressure or anticyclonic areas, and into and around low pressure or eyelonic areas (see ATLANTIC). By comparing the maps of the prevailing winds with those of the oceanic currents, it will be seen that the latter roughly coincide with the winds blowing out of and around the high-pressure areas in the Atlantic and Pacific occans. There have been many theories to account for oceanic circulation, but recent researches show that all the principal surface currents have their origin in, and are maintained by, the action of the prevailing winds of the globe, modified locally by variations in temperature, density, evaporation, gravity, and rotation of the earth.

The plicinomenon of occanic circulation is to be seen in its simplest form in the westerly winddriven currents of the trade-wind regions of the Atlantic and Pacific. The heated surface waters of the tropics are there driven to the west, and banked up towards the castern shores of America, Africa, Asia, and Australia. On the other hand, the cold deep water is drawn up along the western shores of America and Africa to take the place of the surface water driven before the trade-winds. The temperatures of the water towards the western parts of the oceans are thus higher and more uniform to considerable depths below the surface than in the eastern, where they are lower and have a wider range at different seasons or different states of the wind. The writer has even measured this effect of the wind in Loch Ness in Scotland; he found the cold water from the bottom drawn to the surface in the course of a few hours, and the warm surface water banked up to the north end of the loch, during a southerly gale. Recent observations show that similar effects are produced in the great occans during a continuance of winds off shore.

In the Atlantic a large proportion of the waters of the equatorial current are forced into the Caribbean Sea through the passages in the Windward Islands, and then into the Gulf of Mexico, principally through the Yucatan Channel. The amount of accumulation or heaping up of water in the Gulf of Mexico, through the action of the trade-winds, has been measured by the officers of the United States Coast Survey; it has been found that the Atlantic Ocean at Saudy Hook is 3 feet 4 inches lower than the waters of the Gulf of Mexico at the mouth of the Mississippi. This is partly the origin of the force constantly at work to keep up the flow of the Gulf Stream through the Strait of Florida. The stream as it flows through the narrowest part of the strait is 50 miles wide, and has an average depth of 350 fathous. In the axis of the stream the velocity is four or five knots an hour, two miles an hour or even less along the edges, and probably the same near the bottom. It is estimated to be 150 miles wide off Charlestown, and 300 miles wide off Sandy Hook; it then spreads fan-like over the surface of the North Atlantic. Off Cape Hatteras the velocity is about three miles an honr, off the banks of Newfoundland one and a half mile an hour, then the rate slowly merges into that of the north-easterly drift of the Atlantic—four or

five miles a day. The mean surface temperature in the straits is 81° 5 F.; off Sandy Hook, 73° 4 F. The average bottom temperature in the strait at 400 fathoms is 45° F.; off Charlestown, at 300 fathoms, 53° F.; and off Sandy Hook, in 200 fathoms, 46° 5 F. The bottom in the strait, and for some distance north on the 'Blake platean,' appears to be swept by the current so that no fine ooze is allowed to form; but the bottom, where hard, is made up of the remains of surface and bottomliving organisms, often cemented together into nodules and phosphatic concretions. The diagram in the article ATLANTIC shows the distribution of temperature across the Gulf Stream between New York and Bermuda. The Gulf Stream water of the North Atlantic is carried towards the coasts of Europe by the goath water of the stream water of the s of Europe by the south-west winds; one branch passes on to the coasts of Norway, and another south to the coasts of Spain and Africa. As this water is carried into colder latitudes it sinks on becoming cooled because of its greater density, so that off the coasts of Britain warmer water is found at a depth of three-fourths of a mile than at a like depth off the tropical coast of Africa, where the winds are off shore. While a warm current passes to the Arctic Ocean along the coasts of Norway and Lapland, a cold current from the Arctic comes down the coasts of Greenland, and along the coasts of Labrador and the United States, inside the Gulf Stream, and ultimately sinks beneath it into the deeper parts of the North Atlantic basin. The passage from the green, cold, turbid waters along the American coast into the deep blue, warm waters of the Gulf Stream is sometimes sudden and well marked, and is usually observed by all who sail from the shore seaward.

The winds blow out of and around an area situ-

ated in the North Atlantic, between the north of Africa and America, and the surface currents of water also circulate around this area, which is known as the Sargasso Sea. Here are found immense banks of floating Gulfweed (q.v.), covered with peculiar species of animals: Crustaceans, Polyzoa, Annelids, Molluses, Hydroids, and Fishes, all the same colour as the weed, presenting remarkable examples of protective proceedings.

protective resemblance.

A very similar, but not such a well-defined or constant stream as the Atlantic one, is found in the North Pacific, and is known as the Kuro Siwo ('Black Stream') or Japan Stream. On approaching Japan in April from the south the Challenger found a belt of water running to the eastward at the rate of three miles per hour. In this stream the temperature changed from 63° to 68° F, suddenly several times without any alteration in the rate of the current. In June no current was found 30 to 40 miles from the coast, but close to the south coast of the main island there was a northward current of two miles per hour and a mean temperature of 72° 5 F. Alternating bands of cold and warm water were also found by the *Challenger* in the Gulf Stream near its shore edge. The origin of these alternate belts of water in the Japan Stream is probably due to the monsoons. The northern equatorial current striking against the eastern side of the Philippine Islands is, as is well known, diverted to the northward, along the eastern side of Formosa, after passing which it appears gradually to lose its distinctive character. During the north-east monsoon a cold surface current is running to the southward from the Japan and Yellow seas. It appears therefore highly probable that the equatorial current, instead of losing itself as is supposed, when it meets with the cold water from the Japan and Yellow seas, is diverted to the castward along with a cold northerly current, the two running together side by side without intermingling their waters. When the north-east monsoon ceases the current

from the Japan and Yellow seas also ceases, which causes the slackness of the Knro Siwo, south of the main island, in June, as it is then only due to the equatorial current. Later on, in July and Angust, when it is further augmented by the surface drift from the China Sea in the south-west monsoon, it runs again with great rapidity, and is wholly a warm current. These peculiar effects are probably not experienced to the eastward of the meridian of 140° E.; there apparently the stream is always a warm one. The current that runs from the Arctic Ocean through Bebring Strait is insignificant compared with the Arctic currents of the Atlantic. There is an ill-defined Sargusso Sea in the North Pacific, in some respects resembling that of the North Atlantic. The surface currents in the Indian Ocean are, as is well known, changed with

the shifting of the monsoons.

From the Challenger observations it appears to be proved that the dense warm equatorial waters which pass along the eastern shores of South America, Africa, and Anstralia into the Great Southern Ocean that surramds the world in latitudes beyond 40° S., become cooled in these latitudes, and sink to the bottom through the other waters on account of their greater density. This water is then drawn slowly north as a great indraught to supply the loss by surface currents and evaporation in the equatorial regions of the Atlantic, Pacific, and Indian oceans. It appears then that by far the larger part of the cold water that fills those great ocean-basins is cooled and sinks to the bottom in about 50° S. lat. A portion of this water seems also to be drawn southward to supply the place of the relatively light though cold surface currents that flow north from the Antarctic in the regions of floating ice. The great bulk of the ocean has a lew temperature—below 45° F.; it is ice cold in the Atlantic at the bottom even under the equator. The warm surface water is a relatively thin film, but this film is much deeper towards the western parts of the oceans in the tropics than in the eastern. On the other hand, in the regions of the western yards of temperature at latitudes the layer of warm water is deeper in the castern parts of the oceans, as has been already noticed in referring to the deep-water tomperatures off Britain and tropical Africa. These facts are clearly shown on the Challenger maps, showing the distribution of temperature at 10, 20, 50, 60, 100, and 300 fethous

showing the distribution of temperature. 50, 60, 100, and 300 fathens.

The surface currents may, as we have seen, have a considerable velocity, but there is no evidence that any such currents exist in the deeper waters at the bottom of the ocean; the movements there must be slow and massive. It is true that between oceanic islands and in positions like the Wyville-Thomson Ridge, between Scotland and the Farie Islands, where the tidal wave is confined, the ridges are swept by currents at a great depth; but these are exceptional cases. In the open ocean the temperature decreases with increase of depth, except in the Arctic or Antarctic, where there is melting ice on the surface. In enclosed seas, like the Mediterranean, Caribbean Sea, Gulf of Mexico, Shin Sea, and many others, there is a large body of water at the bottom of a nearly uniform temperature; the depth at which this uniform temperature is reached depends on the height of the ridges cutting enclosed seas off from general ocean circulation. The deeper water in these can only be renewed by vertical enrents set in motion by the winds or by convection currents. The direct influence of ocean currents on elimate is undoubtedly great, but this influence is most marked by the indirect effects of the prevailing winds blowing from off these currents towards the land, earrying with them heat and moisture.

Gulfweed (Sargassum), a genus of seaweeds (Alge) of the sub-order Fucacea, of which two species (S. rulgare and S. bacciferum) are found floating in immense quantities in some parts of the Atlantic, Pacific, and Indian occans. They are tropical plants, although sometimes carried by winds and currents to the British coasts. The frond is very long, and is furnished with distinct, stalked, nerved leaves, and simple axillary stalked airvessels. The receptacles are linear, in small axillary clusters or racences. The trivial name bacciferum, applied to one of the species, is derived from the berry-like appearance of the airvessels. The gulfweed has only been found floating, but there is reason to think that it is at first attached to the hottom of comparatively shallow parts of the sea. It floats in large fields, or more frequently in long yellow lines in the direction of the wind. In crossing the Atlantic, its presence is regarded as a sure indication of the Gulf Stream, by which it is wafted northward and castward. Where the Gulf Stream is deflected from the banks of Newfoundland castward, and sends off its more southern branch towards the Azores, is situated the Sargasso Sea, 'that great bank of weeds, which so vividly occapied the imagination of Christopher Columbus, and which Oviedo calls the seaweed meadows' (Humboldt). The quantity of floating scaweed is often such as to impede the progress of ships, Multindes of small marine minuals accompany it, Miltindes of small marine minuals accompany it, with fishes ready to prey on them.—The gulfweed is caten in China; and in other parts of the East also it is used in salads and as a pickle.

also it is used in salads and as a pickle.

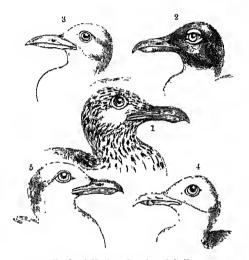
Gull (Laous), a genus of web-footed birds belonging to the Laride, a family of long-winged sea-birds having the longitudinal nostrils placed laterally and not covered by a core, the three anterior toos completely webbed, the hind-toe, when present, small and not touching the ground. The family includes the Scissor-bills or Skimmers (Rhyneltopidae), the Terms or Sen-swallows (Sternine), and the true Gulls (Larinae). The true gulls are of less slender build thun their nearest allies, the Terms; their wings are not quite so long and pointed, and they have the bill more hooked. The most important genera are Steverarius, the voracious and predatory Sknas; Rissa, the Kittiwakes; Xema, the fork-tailed Gulls; and Larus.

The genus Larus comprises sixty species, cosmopolitan in their distribution, and includes many of

The genus Larus comprises sixty species, cosmopolitan in their distribution, and includes many of the larger gulls and nost of those common in Great Britain. The prevailing colour is 'white, with a gray mantle varying in shade from tho most delicate pearl gray to a dark blackish slate or nearly black,' and there are often black markings about the head, which, however, vary in different sensons. The two sexes are usually almost alike in colour, but the young are dusky and brownish and have the bill dark, while in adults the bill, legs, and feet are bright red or orange. The legs are very powerful, and are placed well forward so that the body is carried horizontally, the bill is stout and curved, with a prominent angle on the lower part and a corresponding swelling on the upper. Though most gulls are marine, they frequent, and even breed by inland lakes not far from the sea, and large flocks of them may often be seen following the plaugh eagerly picking up the worms and grubs. They are very voracious and will cat almost anything, but feed chiefly on fish and molluses. To break the shells of the molluses they sometimes carry them high into the air and drop them upon a rock. Andubon tells of a gull observed by him which, when the shell did not break the first time, carried it a second time higher, and a third time higher still. Some of the larger species—e.g. the Great Black-backed Gull (L. marinus), prey even upon the eider-duck and other wild fowl, and vory many

GULL 463

steal the eggs of other birds. Many of the species are migratory, and all are powerful of wing and fly with apparent ease against a storm, during which, however, they never soar so high as in fine weather. Their keenness of vision is remarkable, as must have been observed by every one who has watched them following in the wake of a steamer, and noted the distance from which they see even a small fragment thrown on the water, and the unerring precision with which they dark down upon it.



Heads of Various Species of Gulls: 1, Great Black-backed (young); 2, Black-headed; 3, Kitti-wake; 4, Lesser Black-backed; 5, Herring Gull.

Gulls often nest together in large numbers, and to dwellers by the sea a 'gullery,' with its busy life and incessant noise of screaning and quarrelling, is a not unfamiliar sight. The characteristic cry of many gulls is well suggested in the old name of 'Sea-mews.'

The most widely distributed British species is the Herring Gull (L. argentatus), which breeds on precipitous cliffs or isolated rocks all round the coast. The nest is made of grass and is usually placed on a ledge of rock, but sometimes on the ground; and Howard Saunders says that in North America, when the bird has been repeatedly plundered by fishermen, it even nests in trees. The eggs, usually three in number, are light brown, green, or pale blue, mottled with a darker shade. The male bird measures 22 to 24 inches, the female is slightly smaller; the gray of the back and wings is lighter smaller; the gray of the back and wings is fighter than in most species, and on this account it is often called the Silvery Gull. The Common Gull (L. eunus) is only a winter visitor to England and Wales, but breeds abundantly on the Scottish coasts and fresh water locks, in the Hebrides, and in Orkney and Shetland. It lays three eggs, breeding in colonies on grassy islands and slopes not far above the level of the sca, and seldom going far from land. Its average length is 18 inches. The Great Black-backed Gull (L. marinus) rarely Great Black-backed Gull (L. marinus) rarely breeds in England, though large flocks may be seen at some seasons. In Scotland, particularly in the Outer Hebrides, it is more plentiful, though by no means common. The Lesser Black-backed Gull (L. fuscus) is very abundant in the marshes of Cumberland, and nests also in Devon, Cornwall, and throughout Scotland. Its plumage is white in summer except on the mantle, where it is dark gray or black. The Black-headed Gull (*L. ridibundus*) is the commonest species in Ireland, and is plentiful on the flatter portions of the English

and Scottish shores. It has a dark-brown bood and Scottish shores. It has a dark-prown nood in summer which disappears in winter. The Glaucons Gull, or Burgomaster (*L. glaucous*), and the Iceland Gull (*L. lencopterus*), visit Britain occasionally in cold weather. One specimen of Ross's Gull (*Phodostethia rosca*) was shot in Yorkshire in 1846. Nothing is known of the breeding habits of this rare and beautiful Arctic species, and colly twenty-three avanues had been recorded. only twenty-three examples had been recorded previous to 1881-82, when it was seen in large flocks off Point Barrow in Alaska. About thirty specimens of another truly Arctic species, the Ivory Gull (Pagophila churnea), have been taken in Britain at various times. In North America gulls are very plentiful. The Great Black-backed Gull (L. marinus) and Herring (full (L. urgentatus) are common in the north-east, while the Common Gull is represented by two closely related species (L. brachyrhyncus and L. delawarensis). The Mackerel Gull (Hydrocolæus scopulinus) of New Zealand may often be seen in attendance on the long-billed oyster-catcher as he digs in the soft sand for blue crahs and other delicacies, waiting quietly until something is discovered, then flapping his wings and making a dash at it. Even if the oyster-catcher succeed in flying off with his prize he is inevitably overtaken and compelled to give it up to the swifter and stronger gull,

The Great Skua (Stercorarius catarrhactes), which breeds in the Shetlands, and is occasionally seen on the coasts or fishing-grounds farther south, is a splendid example of a robber gull, deriving its food chielly by victimising or even killing other sea-fowl. It measures about 2 feet in length; the phimage is predominantly brown, 'with white bases to the quills conspicuous in flight;' the cry, as the name suggests, is skui, skui; the nest is a cavity in the moss and heather of the highest moorlands, and is prepared in the later half of May; the eggs (never more than two) are olive-brown. Three other species of Shua are recoved among British high.

species of Skin are recorded among British birds.
The Kittiwake (Rissa triductyla) is a very common bird on British coasts, and is elsewhere widely distributed. As the specific name suggests, the hind-toe has disappeared; the length of the hody is about 15 inches; white predominates in the plumage, but the upper surface is gray, and there is some black on the wing. The kittiwakes feed on lish and other marine animals, make nests of seaweed and fletery on the recky below. In the seaweed and flotsam on the rocky ledges, lay two or three eggs 'from grayish-white to olive-buff, blotched and zoued with ash-gray and rich brown,' Howard Saunders notes that as the eggs are seldom laid nutil the later part of May, many of the young can scarcely fly or are still in the nest by 1st Angust, when the Sea Birds Protection Act leaves them to be sloughtered in thousands to provide them to be slaughtered in thousands to provide plumes for ladies hats.

The flesh of gulls is rank and coarse, but that of the ness of guils is rank and coarse, but that of the young birds is salted for winter use on many northern coasts. The eggs are much sought after, and it is stated that from 40,000 to 50,000 eggs of the herring gull are taken for food, in a single season, from the island of Sylt alone. See Howard Saunders, 'The Larine or Gulls,' in Proc. Zool. Soc. (1878); and his and other manuals of

British birds.

Gull, Sir William Withey, physician, was born 31st December 1816, at Thorpe-le-Soken, in Essex. He studied at Guy's Hospital, and graduated M.B. at Loudon University in 1841. Six years later he was made professor of Physiology at the Royal Institution, a post which he held for only two years. About the same time (1847) he became physician and lecturer at Gny's Hospital, his specialty being clinical practice. For his treat-ment of the Prince of Wales in 1871 he received a baronetcy, and was appointed physician-extraordinary to the Queen. He became a Fellow of the Royal College of Physicians (1848) and of several other medical and learned societies. He died 29th January 1890. Sir W. W. Gull published numerous papers and addresses, as Reports on Epidemic Cholera (with Dr W. Baly) in 1854; Gulstonian Lectures on Paralysis; the Hunterian oration in 1861 and the Harveian in 1870; Clinical Observations in Relation to Medicine in Modern Times, in 1869; and Alcohol as a Medicine and as a Beverage (1878).

Gullet. See Œsophagus.

Gulliver's Travels. See Swift.

Gum, a general term applied to certain exudations from blees and plants, which are very different in their chemical characters and their general There are, however, three classes of gums which may be more particularly referred to -viz. those containing arabin, those containing

bassorin, and gum-resins.

(1) Gums containing arabin are best represented by gum-arabic, the ordinary gum of the shops. This substance is found as an exudation on the bark of the Acacia Senegal, a tree of some 20 foot in height, growing abundantly in western Africa. According to the eare taken in collecting it, it ranges from the pure white or colourless gum of Kordofan to the dark-reddish varieties imported from Senegal. Chemically these are absolutely identical, and therefore a single description will suffice. It occurs in irregular hunps, somowhat spherical or vermicular (as in Gun-Senegal). It is brittle, and shows a glassy fracture. It dissolves readily in water, forming a elear, viseid, adhesive solution; but it is insoluble in strong alcohol, glycorine, ether, oils, or chloro-form. The addition of alcohol to a watery solution throws down a precipitate of arabin, if a few drops of hydrochloric acid have previously been added.

Medicinally it has very slight remedial powers, but it is largely used in prescriptions for the purpose of suspending insoluble substances in mixtures. The liner varieties, owing to their eost, are rarely found outside the druggist's shop; but in the manufacture of confections and in the arts large quantities of the cheaper kinds are employed. These are known under different names, indicating the district from which they are imported. The ebief are: Senegal gum, found in large firm reddish masses; Suakin gum or Talka gum, forming dull opaque-looking tous, colourless or brownish; and Moroeco or Barbary gum. Cape gum is derived from the Acacia horrida, a native of Cape Colony, while Wattle gum is a very adhesive variety obtained from Australia. East Indian gum is an African product, being simply imported into Bombay from the Red Soa.

(2) Gums containing Bassorin. - The chief of these, Tragacanth, is obtained from various species of Astragalus, low spiny bushes, natives of Asia Minor and Persia. When the stem of one of these plants is cut transversely it will be found that the space usually occupied by the pith has the appearance of a translicent guinny mass, which the microscope shows to possess the structure of an ordinary pith. If incisions are made in the bark, this semi-solid exudes under pressure, and, according to the nature of the incision forms flattened wing-like masses, nodules or worm-like pieces. The finest variety is known as Flake-Tragacanth, consisting of flakes 1 to 3 inches long by 1 inch in breadth. The surface is marked by wavy lines and the flakes are much conforted. Tragacanth is reprehensely white and without last a conventer. translucent, white and without Instre, somewhat flexible, and not brittle, and with little taste or smell. When placed in water it swells, absorbing fifty times its weight of that liquid, and form-

ing a thick mucilage. It has no active medicinal properties; but it is much used for firming pill masses and lozenges. It enters into many emulsions, for instance, that of cod-liver oil, and it is sometimes employed as a stiffener for the hair. It is used as a stiffening material for various textile fabrics, and is much valued for this purpose, where it is not desired to give gloss to the material.

Besides these true gums, there are (3) the gum. resins. In general terms these consist of certain resins soluble in alcohol, and of the true gum, so that it requires both water and alcohol to dissolve them entirely. They are chiefly used in medicine and perfumery, and may be said to form a connecting link between the true gums and the true resins, commercially speaking. The principal are: (1) (Sum-Ammoniacum (see Ammoniacum), (2) Gum-(see Asarothianum (see Asarothianum, (2) Guin-Asarothian (see Asarothianum (see Galbanum), (4) Guin-Galbanum (see Galbanum), (5) Guin-Gamboge (see Gamboge), (6) Guin-Myrrb (see Myrrh), (7) Guin-Seammony (see SCAMMONY). There are many other gnms known; but these are the ones most used in the arts and medicine. Many also of the true resins, as copal, anime, &c., are called gams, but they are strictly resins. See RESINS.

Gum-substitutes are manufactured from various forms of starch, either by baking, reasting or chemical treatment, so as to convert the starch into Dextrine (q.v). They are made on a very extensive scale, and are largely employed in dressing calicos and other fabrics, also as a substitute for the more expensive gnms in gnmming-paper, as in the ease of postage-stamps and labels, which are made adhesive by dextrine. For this and some other purposes, the gum substitutes are superior to the real gums, as they are easily dissolved, and can be spread more equally over a smooth surface. For the elewing-gum in uso in the United States, see CHEWING-GUM; and for gnm-trees, see EUCALYP-

TUS, TUPKLO, and LIQUIDAMBAR.

Gumbinnen, a thriving town of East Prussia, 72 miles by rull E. of Königsberg. Dating from 1724, it owes its prosperity to the settlement eighty years later here of many Protestant Salzburgers. Pop. 10,206.

Gun-boil, an Absecss (q.v.) near the root of a tooth, and usually discharging itself towards the mucons membrane of the gun, but sometimes making its way more deeply towards the skin of the face, and if allowed to burst there causing considerable deformity. Com-boil should be treated, in external injury, and free washing of the mouth with hot water; but as soon as the presence of matter can be ascertained, it is usually a good practice to give vent to it by a pretty free incision. Complete cure follows the removal of the tooth at the root of which the inflammation has begun; if it be left the disease is apt to recur. If the abscess threaten to barst through the skin, extraction of the tooth is imperative. See Teeth.

Gunning (in vegetable pathology Gummosis), a disease which attacks the plana, cherry, peach, and other stone fruit-trees, often proving fatal to the limbs attacked, and ultimately also to the whole tree in virulent cases. Recent observations seem to prove that the cause of the disease is a fungus named Coryneum Beijerinekii. The myeelium of the fungus develops a ferment which transforms the cell-walls, starch grannles, and other contents of the cells into gum. While in some eases the myeclium is obviously the exciting cause, in others the forment only appears to be the contagions agent. One point seems quite clearthe fungus cannot penetrate sound healthy barkthere must be some would or abrasion before the

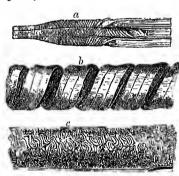
germ-inbes can enter the cellular tissues in which alone they can spread. Unfortunately such injuries occur from many causes in the class of trees named, and probably insects are the chief agents in carrying the contagion from tree to tree. In prescribing remedies, those that are preventive are obviously best. Wounds as soon as they are observed should be coated with a thick paste of quickline or coal-far. Gunnued branches should be cut away without delay and branch, and the wounds dressed at once with coal-far.—It is conjectured that Corynenn or some similar fungus is the cause of the disease that produces gum-tragacanth, and probably other guns and gum-resins.

Gumri. See Alexandropol.

Gunti, a river of India, rises in the Northwestern Provinces, in a small lake in 28° 37' N. lat, and 80° 7' E. long., and, after a sinuous but generally south-easterly course of nearly 500 miles, enters the Canges 56 miles helow Janupur. It is navigable by boats of 17 tons for over 400 miles; at Lucknow it is spanned by five bridges, and at Janupur by a bridge of sixteen arches.—There is also a thinti River in Bengal, which joins the Meghna after a course, inclusive of windings, of 66 miles.

Gun. The term gnn formerly comprised many varieties of the weapons now more correctly termed Finearms (q,v.), and is still applied in a general sense to Cannon (q,v.) and large ordnance, also to quick-firing or Machine Guns (q,v.); but it is now more specially held to signify the sporting gnn as distinguished from the military Rifle (q,v.). The modern shot-gun is invariably breech loading, and usually upon the 'drop-down' principle (see Breech-loading). The manufacture—barrel-welding—is sufficiently interesting to warrant descriptive details. The other processes, some eighteen or twenty in number, eall only for the skill of the trained workman.

Shot-gan barrels are generally hand-forged from a rod of special material which is usually composed of iron of two distinct varieties, or of iron and steel. It is necessary that one of the metals be softer than the other; and the greater the proportion of the harder metal, and the harder the quality of the softer metal, the better will be the quality of the welded barrel. Some varieties of



a, gun-barrel iron, twisted and laid into a riband;
 b, portion of gun-barrel coil;
 c, portion of silver-steel Damascus barrel.

gun-iron contain 70 per cent. of steel; in others a good quality and an ferior quality οf iron are used together, and no steel enters into the composirod of gun-iron is built up of alter nate layers of the hard and soft metals, and in the manufacture

of a Damascus barrel this rod must be twisted upon itself before it is welded side by side to one or more rods, or welded into a barrel. These twisted rods are drawn out between rolls into a flattened rod or 'riband' of metal, the riband being composed of one, two, three, or more twisted rods according to the quality of the barrel or the

finences of figure desired. The Belgian welders are more expert than the British in making the finest figured barrels, putting as many as six differently twisted rods together to form a single riband; but Belgian barrels are not so hard as the English, and are generally considered to be inferior to the best Birmingham hand-welded barrels. welder, having prepared his ion and received it from the mill rolled down to the proper size, pro-eeds to form the bancl by twi-ting the riband upon a mandril, just as one would cover a whip-stock with a narrow strip of leather. This coil has then to be heated, a few inches at a time, and the edges welded to each other, the result being a tube four times heavier than it will weigh when finished three meaver man it will wright when intended by boring, grinding, and filing, which are the next three processes through which the bariel mist pass. In double shot-gains the two tubes to four the barrels are brazed together for a few inches at the barrels are brazed together for a few inches at the breech end, and soldered to each other and to the two ribs and 'packing' which unite them throughout their entire length. The breech actions are fitted to the barrels, the lock-work and bolting-mechanism adjusted, and the gun is ready for the stocker; he roughly fashions the piece of walnut to which the ironwork is secured by the 'screwer,' who were the gun on to the 'finisher' to prepare who passes the gun on to the 'finisher' to prepare for its final embelli-liments, in which are comprised the processes of polishing, engraving, hardening, blueing, and tempering. The barrels when finely blueing, and tempering. The barrels when finely polished are treated with acid, which rusts the surface of the metals of which they are composed, and eating more readily into the softer metal turns it a darker colour. This process, termed 'browning,' occupies several days, and when successful shows clearly the dama-sening or curls of fibre obtained by twisting the gun-iron rods in the carliest stage. A barrel not showing such eurls would be termed a 'scelp' barrel if it were a twisted welded barrel, but if of one uniform colour, unbroken by regular markings, it would probably be composed of plain iron or steel only.

The superiority of the Damascus barrel to one of best modern steel remains a vexed question. The evidence addreed on behalf of the Damasens is evinence address of henait of the Dannasens is sufficient to prove its superiority over certain qualities of steel, but it is not overwhelming; and it is now generally admitted that steel can be obtained of sufficiently good quality and possessing sufficient strength to withstand any normal strain to which as a shot-gun barrel it may be subjected. The advocates of the welded barrel contend that they which cannot be detected by the eye or by flaws, which cannot be detected by the eye or by the most searching test, occasionally exist in steel, making it unreliable for use as a gun-barrol. Sir Joseph Whitworth's fluid compressed steel has been used very successfully as a material for shot-gun barrels, but the immunity from flaws which barrels of this steel enjoy is said to result from the careful testing and examination of each individual tube rather than from absolute perfection in the metal itself. The complete and almost perfect heterogeneity of the material of the Damasons barrel produces a homogeneous whole, which, when soundly welded, has no weak spot, and will neither split longitudinally nor break off short as steel barrels have done, but when burst is pulled, as it were, from shred to shred, exhibiting great tenacity in every direction. The steel barrel here referred to its that dealled from a solid red of best wild stand. is that drilled from a solid rod of best mild steel. Steel barrels drawn from blanks in the same manner as ordinary tubes are inferior to the drilled barrel. Still less reliable are the lap-welded steel barrels in which the two edges of a strip of metal are brought together and welded as it passes at welding heat between the rolls. Cold drawn steel barrels were at one time manufactured, but proved too expen-sive, and twisted steel barrels are not yet a

238

commercial success. The standard size of the modern shot-gnu is 12 bore—i.e. twelve spherical leaden bullets of the same diameter as the interior of leaden bullets of the same diameter as the interior of the barrel will weigh 1 lb. avoir.; formerly 16 and 20 bores were much in vogne, and 16 bores are still very common in Germany; 10 bores are much used in North America; 8 and 4 bores are used only for wild-fowling; and punt-guns, guns of from 1-inch to 3-inch bore fitted into shooting punts, are employed for firing from ½ lb. to 4 lb. of shot at a time into flocks of sea-fowl on the coast or in tidal estabaries

estnaries.

With the exception of the punt-guns, which require special mechanism, gams of all bores are made upon the same principle of breech-loading, and nearly all are more or less choked—i.e. the diameter of the barrel is suddenly lessened near the muzzle, forming a cone which causes the pellets of the charge to fly from the gun more compactly and at an increased velocity. Such is the perfection to which the boring of shot-guns has been brenght that a 7-lb. gun may now he expected to send on an average 220 pellets of a charge containing 305 pellets into a circle 30 inches in diameter (or 60 into a 10-inch square) at 40 yards distance, the pellets having an average velocity at the muzzle of 840 feet per second, and a striking force at impact (40 yards) of 1.90 oz.

Shot-guns are now built very much lighter than when breech-landers first came into general use (1865); shorter barrels are used without loss of shooting power or appreciable increase in the volume of the recoil. Smokeless explosives are in general use all the world over for shot-guns, and the results of the slightest variation in the charge or quality of the powder, or in the size and quantity of the shot, can be ascertained with the greatest scientific accuracy, by means of special instruments found in all leading gun-manufactories. Shot-gun manufacture is a incchanical science as well as a maintachire is a incenanical science as well as a handieraft, and the finest productions of the most renowned gun-makers will always command £50 or even higher prices. Cheap ill-made, ill-fitted, ill-regulated guns, shaped by machinery, or still more roughly by hand labour, constitute the shot-gun of commerce, and their value fluctuates with the price of material. The shot-gun of the best class a new considerate that a new departure. is now so highly perfected that a new departure, whether towards the development of the killing powers of the weapon or elaboration of its mechan-ism, is undesirable, and, until some radical change in the composition of explosives, or the method of using shot guns, takes place, no noteworthy improvement upon the existing type of gnu can be expected.

See the articles Gunpowder, Fireaums, Breedin-Loading, Cannon, Musker, Riple, Machine Guns, &e.; Greener's Gun and its Development (1881), and his Modern Stat Guns (1888); Hawker's Guns and Shooting Instructions (1844); Shooting, by Lord Walsingham and Sir R. Payne-Gallwey (Badminton Lib. 1886); Payne-Gallwey's The Fowler in Ireland (1882); Walsh's Modern Sportsman's Gun and Rifle (2 vols. 1883-84); General Norton's American Inventions and Improvements in Breech-loading, Small Arms, Heavy Ordnance, Machine Guns, Magazine Arms, &c. (New York, 1889).

Gunboat, a small boat or vessel armed with cunboat, a small boat or vessel armed with one or more guns of heavy calibre. From its small dimensions, it is capable of running close inshore vivers, and from the same cause it has bane of being hit by a larger vessel at the ge which the carrying power of its guns to maintain. At the outhreak of the ur, a large squadron of them was hastily I for the British navy for the first time, tage was small; and their armament insisted of one 8-inch gun and one 100-rustrong gun. Gunboats in their more Gunboats in their more riustrong gun.

modern form (like the Staunch) are small mastless vessels mounting one large gun in the bow, and vessels mounting one targe gun in the bow, and propelled by an engine with single or twin screws. The gun is pointed by means of the helm or the screws, and the gunboat is in fact a floating guncarriage. In the British navy these gunboats carry an armonr-piercing gun of 18 tons, on a draught of only 4 feet. But they have been designed to carry 35-ton guns, or heavier. In 1890 there were on the British Nary List 114 of these vessels, of which 43 were called third class, and are intended for coast defence. The largest size of the first-class gunboats then in commission or building were of 735 tons and 4500 horse-power. At the beginning of the century the United States had over 250 of these vessels; but the 'gunboat system' was soon abandoned. In 1890 there were attached to the United States pavy only five vessels called gunboats, all of the fourth rate (i.e. below 1000 tons), and including one torpedo rant; and two gunvessels of 1200 tons, newly built. Most continental navies are provided with gunboats of various size and construction.

Gun-carriage is a most important adjunct to every piece of ordinance. It requires to be of great strength in order to resist the shock of discharge, and, in the case of a field-gun carriage, to bear an commons strain in passing at a rapid pace over broken, uneven, or rocky ground without being unduly heavy or wanting in mobility. A large department, fitted with splendid machinery, in the Royal Arsenal at Woolwich, called the Royal Carteria. riage Department, is charged with this branch of manufacture for the British service, whether naval or military. See Cannon for plates showing several of the numerons patterns, and also Moncrieff Pres.

Gun-cotton. There are a very large number of explosive nitro-compounds which may be divided into two main classes—viz. (1) Those containing Nitro-glycenine (q.v.), in which is included the great dynamite class, and (2) those not containing nitro-glycenine. Cun-cotton is an explosive nitro-compound of the latter class, and is by far the most important of the class.

most important of the class.
So long ago as 1832 it was discovered by Braconnot that woody fibre and similar substances could be converted into highly combustible bodies by the action of concentrated nitric acid; six years later Pélonze extended this discovery to cotton and other organic substances; be was followed by Dumas, who treated paper in a similar way, and he proposed to make cartridges with paper so treated, the idea being that no residue would be left in the larged of the first that no residue would be left. in the barrel after firing such cartridges. But no practical result followed these discoveries until in 1845 Schöulein, a German chemist, having litt upon the proper mode of treating cotton with nitric and sulphinic acids, announced the discovery of gun-cotton, which he proposed as a substitute for gunpowder. He elaimed for it that the advantage it had over gunpowder was that it burned withont leaving any residue, and consequently without snoke. He prepared it by immersing carded cotton wool in a mixture of nitric and sulphuric acids, and the equation for its formation may be stated thus:

Nitric Acid, Bi-nitrated Cellulose or Gun-cotton. Water. Cellulose. $C_6H_{10}O_5 + 3(H_1NO_3) = C_0H_7O_2, 3(NO_3) + 3(H_2O).$

It will be observed that no mention is made of sulphuric acid in this equation, the presence of which is, however, essential in the production of guncotton, for although it takes no active chemical part in the action, it absorbs the water which is formed by the chemical transformation, and thus

keeps the nitric acid up to its full strength. Schönbein's discovery gave a great impetus to the question, and experiments continued to be made by many eminent chemists in nearly every country in Enrope with the idea of ntilising the new explosive for military purposes. It was first mann-factured in England on a large scale in the year 1847 by Messrs Hall & Son of Faversham; but, in addition to minor accidents, a terrible explosion took place in their works, which created so much district that its manufacture in England was discontinued for several years, as the cause of the explosion, with the then imperfect knowledge possessed of the subject, could not be satisfactorily accounted for. The first country to turn Schönaccounted for. The first country to turn Schön-bein's discovery to practical account was Austria. General Von Lenk, an Austrian artillery officer, after extensive trials succeeded in greatly improving the method of manufacture, by which means he was enabled to moderate and ensure a uniform rate of combustion of gun-cotton in air; his discovery was considered of so much importance that in the year 1852 several batteries of Austrian artillery were armed with gun-cotton cartridges. But it soon fell into disrepute, not only on account of its unstable nature, but also because it was found that Von Lenk's improvements were of no practical utility when the gun-cotton was confined in the hore of a gin; the great heat generated caused the inflamed gas to penetrate rapidly through the whole cartridge, so that there was little or no retardation in the rate of combustion, and the rapid combination caused excessive pressure in the bore, besides giving very unequal results when fired. Since the failure of the Austrian cartridges gun-

cotton has not been used as a propelling agent on a large scale. But its utility as a disruptive agent has been enormously increased by the discoveries of Professor Sir Frederick Abel and the late Mr E. O. Brown. Nothing daunted by the failure of the Austrian experiments, nor by the explosion at Messrs Hall's works, Sir Frederick Abel continued his experiments, and he ultimately discovered a method of manufacture whereby not only a complete purification from free acid is assured, but the material is converted into thoroughly compact homogeneous masses. As a result of his expericotton has not been used as a propelling agent on a homogeneous masses. As a result of his experi-ments the method of manufacture adopted in England may be briefly described as follows: the best white cotton waste alone is employed; this is first thoroughly cleansed from all grease by boiling with alkalies; it is then picked over by hand and all foreign substances removed, after which the fibro is separated and all knots and lumps opened out by passing the cotton waste through a 'teasing' machine; it is then cut into 2-inch lengths, thoronghly dried, and divided into charges weighing 1½ lb. each, which are kept in air-tight tin boxes till ready for dipping. The acids used in the manufacture of gun-cotton are uitric acid having a specific gravity of 1.52 and subhuric acid of 1.84 sp. gr.; these are mixed in the proportion of one part by weight of nitric acid to three of subhuric acid, and allowed to cool down in iron tanks. mixed acid is run off into the dipping pans into which a 14-lb, charge of cotton is immersed and which a 14-10, charge of cotton is inimersed and left in for about five minutes, in which time it will have absorbed about 14 lb. of acid. The charge is now allowed to cool down, after which the waste acid is extracted by means of an 'acid-extractor,' and the charge thoroughly washed to remove all the free acid. It is now pulped and pressed under lydraphs are presed under hydraulic presses to one-third its bulk, and moulded into slabs of various sizes and shapes for storing. The mothod of manufacture as here described is perfectly safe, as the gun-cotton throughout is in a wet state.

The properties of guu-cotton, as compared with

gunpowder, are mainly as follows: (1) It can be ignited at a temperature of about 300°, whereas gunpowder requires a temperature of about 600° to ensure ignition; (2) its combustion leaves no solid residue, and is mattended by smoke; (3) the action of gun-cotton is much more rapid than that of gunpowder, and, as has already been pointed out, it is this rapidity of combustion which renders it musuitable to be used as a propelling agent in cannon; (4) whereas gunpowder is greatly influenced and injuriously affected by moisture, gun-cotton on the contrary is perfectly uninjured, and may be kept for any length of time in water without change. For military purposes this is a most important consideration. Apart from the question of using gun-cotton as a propelling agent, its value for destructive purposes was incontestable, but it was thought to be necessary, in order to develop its full power, that the charge should be strongly confined. Experiments, however, conducted by Mr E. O. Brown clearly demonstrated the fact that compressed gun-cotton could be fully detonated in a totally unconfined state by fulminate of merenry. This discovery was thought to apply to dry gun-cotton only, but Mr Brown continning his experiments ascertained that wet compressed gun-cotton could be detonated by using a small primer of the dry material. Still further discoveries were made with regard to the detonation of gun-cotton; it was ascertained that detonation, being established at one end of a continuous row of distinct masses of compressed gun-cotton, travels along the whole length of the row, even if a space of half an inch is left between the disc. These discoveries have raised gun-cotton to the highest rank as a military explosive, as the necessity for storing it in a dry state, which is so highly daugerous, is entirely obviated; it is now always stored in a wet state, the gun-cotton containing about 20 per cent. of water, and is packed in air-tight metal cases, so that the necessity for rewetting seldom occurs; in this condition it

The discovery with regard to its detonation when in a wet state has led to this material being used as the charge for torpedoes and submarine mines. The first pattern of Whitehead torpedo was 14 feet long and 16 inches in diameter; the speed of the torpedo was 9 knots for 200 yards, and the charge was 118 lb. of compressed wet gun-cotton. Several subsequent patterns of torpedoes have been introduced, the latest being 14 feet long and 14 inches in diameter, and by reducing the charge of gun-cotton to 80 lb. the high speed of 27 knots for 600 yards has been attained. The immense importance of this increased speed can be readily appreciated, as it enables a torpedo to strike the vessel at which it is discharged before she has time to get out of the way. The torpedoes are fired by a striker actuated by a spring which is released on the torpedo striking the side of the ship; the striker is pointed, and penetrates a can charged with 38 grains of fulminate; this cap is embedded in an 8 oz disc of dry gun-cotton, enclosed in a hermetically sealed case, and placed as nearly as possible in the centre of the wet gun-cotton charge containing 12 per cent. of water. Gun-cotton is also used as the charge for submarine mines, the charge consisting of from 50 to 500 lb. of wet compressed gun-cotton.

There are various descriptions of marine mines. (1) Ground mines: in these the charge is contained in a case of sheet steel, with cast-iron sinkers attached to it to keep it at the bottom of the harbour or river; these mines are fired electrically by observation from the shore when an enemy's ship passes over them. (2) Buoyant mines: these are anchored a few feet below the surface of the water by a steel

rope attached to a sunken weight; they are conneeted with the shore by electric wires; a bnoy with a signalling apparatus is attached to the mine, and a signaling apparatus is attached to the nune, that when a ship strikes a buoy it rings a bell in the signalling-noon on shore; if the ship is a friendly one it is allowed to pass, lutt if it is an enemy's ship the mine is fired by electricity and the ship blown up. (3) Electro-contact mines: these are used only in places where an enemy's ship would pass. When the mine is strick by a passing ship steal enemy is a passing ship attack arrives or possible pass. a steel spring or pendulum moves towards the point of impact and thus closes the eircuit and fires the mine automatically.

A powder made by the Explosives Company, and generally known under the name of E.C. Powder, s another form in which gnu-cotton can be used. There are two descriptions of this powder-viz. sporting and rifle powder; they are both essentially granulated gnn-cotton, and consist of small rounded grannies, the sporting powder being coloured orange with aurine, and the rifle powder yellow with pierie

acid.

Schultze Powder may be mentioned here as, although not strictly speaking a gun-cotton powder, it belongs to the class of explosive compounds not containing uitro glycerine. The process of manufacture consists in macerating soft timber from which all resmons and fatty matter has been exwhich all resinous and fatty matter has been extracted by chemical means, the residue being pure finely-divided cellulose; this is saturated with nitric and sulphuric acids, and thoroughly purified by washing. The nitro compound thus formed is finely ground and waterproofed, and then sitted into the various sizes of grain required. Schultze powder has been manufactured since about the year 1860, but E.C. is a powder of more recent date. Both these powders are now largely used for sporting purposes. The great advantages they possess over the ordinary bluck powder are thut an equal velocity is obtained with a very much smaller charge, that they do not foul the gun, and that they are nearly smokeless. But against this must be set the disadvantage that under certain conditions the strain on the breech of the gun is conditions the strain on the breech of the gun is greater. But hitherto the results obtained from these powders when used in military firearms are not sufficiently uniform or regular to justify their adoption for military purposes. There can, however, be but little doubt that a smokeless powder of some sort will, before long, be universally adopted by all the great powers of Europe, not only for rifles, but also for artillery purposes; it is no longer an operation as to whether a smokeless powder should a question as to whether a smokeless powder should be adopted or not, but which of all the smokeless powders experimented on is the best for adoption. Smokeless powders, in order to be suitable for military purposes, must not be too violent in their action, they must be able to stand extremes of heat and cold, they must not be very hygroscopic, and they must keep well in store without deteriorating in quality; and the problem to solve is to find a powder which will fulfil these conditions. Nearly all smokeless powders consist essentially of guncotton, or other lower forms of nitro-cotton, acted on by a solvent such as acetie ether or acetone, which reduces the uitro-cellulose to a viscid paste; the paste is then rolled out into sheets, and the solvent allowed to evaporate; the sheets are left as a dense horny substance, and are cut first into strips, and then the strips are ent crosswise into grains of any required size; or the substance can be left in strips or in a fibrous form.

The French, in 1887, were the first to adopt a smokeless powder for the cartridges for their new small-bore rifle, the Lebel. It is known as Vieille's powder, or 'Pondre B;' its exact composition has been kept a secret, but it is believed that picric acid is mixed with the paste as described above.

ballisties attributed to this powder when first introduced were remarkable; a charge of about 70 grains imparted a unuzzle velocity of 2000 feet per grains impacted a unizzie verocity of zouo rect per second, to a bullet weighing 230 grains, fired from a riffe-barrel whose ealibre was '315". But it was found that the powder rapidly deteriorated, and that these results were only attainable with recently manifactured powder, there being a notable falling off in velocity a few mouths after mannfacture. In consequence of this it is stated that the French in 1889 abandoned the use of this powder, and reverted to the use of a good type of black powder until they can discover a more stable one.

The Germans also in 1889 introduced a smokeless powder for their new small-bore ville; it is a nitrated gun-cotton, but although it was very highly spoken of after the autumn manenves of 1889, when it was extensively tried, it is believed that like the French powder it is also wanting in stability, and that the Germans are aheady endeavouring to find

a botter description of powder.

Several patents for smokeless powder have been taken out in England, but none of them are entirely satisfactory, so that at the beginning of 1890 the subject was still under the consideration of the Explosives Committee, to whom it has been referred by the English government; and, although the difficulty of obtaining a smokeless powder of the necessary stability has not yet been sur-mounted, those who have the matter in hand are confident of being able to provide such a powder.

There can, therefore, be but little doubt that, as has aheady been mentioned, not only in England, but also on the continent of Europe, the use of smokeless powder as a propelling agent in all military frearms will be universal. Its introduction will have an immense influence, not only on drill, but also on Tactics (q.v.); and, considering its importance, the English government are wise in being extremely contious before determining on the particular smokeless powder which will eventually be adopted. And until the question is settled the cartridge for the new English smallbore rifle is made up with a compressed pellet of a particular description of black powder.

One of the most powerful explosives known is blusting getatine, which it is made by dissolving orasterily retained, which it is hade by this oring 7 per cent, of gun-cotton in 93 per cent, of nitro-glycerine; it forms a gelatinous mass somewhat resembling honey in colour, and varying in consistency from a tough leathery material to a soft substance like still jelly. It is stronger than dynamite, as the nitro-cellulose itself is explosive, and, if made with great care, and if absolutely free from all impurities, is a safe and stable explosive. But, unless the ingredients of which it is composed are absolutely pure and free from all foreign matter, it becomes exceedingly daugerous when stored in large quantities, as the following story will show. A large quantity of this explosive was sent out to Aden to be used in the execution of the defensive works now being erected there. It was stored in two magazines situated at a considerable distance from one another. One of the magazines blew up, when extra precautions were observed at the other magazine; but after an interval of two or three months the second magazine also blow up. There was no suspicion of foul play, and after an exhaustive inquiry the conclusion arrived at was that the mass had begun to decompose owing to impurities in some of the ingredients, and that it went up by spontaneous combustion. See *Handbook of Gunpouder and Gun-cotton*, by Major-general W. H. Wardell (late R. A.); *Dictionary of Explosives*, by Major Cundill, R. A.; and *Handbook to Modern Explosives*, by Eissler (1889).

Gundamuk. Soo Gandamak.

Gun-factories, ROYAL, form one branch of the Royal Assenal at Woolwich, the other two being the Royal Laboratory and Royal Carriage Department. For a long period there had been at Woolwich a small factory for brass cannon, castiron guns being obtained from private foundries. To this extensive workshops were added in 1855-56, and in 1850 larger ones with very co-tly machinery were creeted for the manufacture of Annstrong These have since been adapted to the other systems of wronght-iron ordnance adopted into the service under the name of 'Woolwich.' The The factories may now fairly be regarded as among the most remarkable sights in the kingdom. The process now adopted in manufacturing guns is explained under CANNON. Besides the furnaces, steam hammers, &c. required for this, the gun-factories contain shops for horing, rilling, tunning, sighting, polishing, and browning the guns, which are then proved at the lints in Plumstead Marshes before being taken to Shoeburyness for further tests. The various shops are connected by lives of railway with the butts and with the river-bank, where there is a pier. Much of the excellent machinery, and notably the bydraulic cranes, are the invention of Sir William (now Lord) Armstrong (q.v.), for some time superintendent of the gun-factories, and were originally developed at his establishment at Elswick. That foundry was for some time recognised as an anxiliary and supplement to Woolwich Arsenal, the guns being turned out at a contract price, payable after they had passed a rigid inspection. The close connection between them ecased in 1863, but many orders are still executed by the Elswick firm for the British government, and considerable rivally exists between it and the Royal Gun-factories. The cost to the nation of the Royal Com-factorics is about £250,000 a year.

Gungl, Josef, composer of dance music, born at Zsambek in Hungary in 1810, was for some time a teacher, then entered a military band as oboist, and was its conductor for eight years. In 1843-48 he gave concerts in Berlin, and there in 1849, after a visit to America, he was appointed musical director to the king. From 1858 to 1864 he was bandmaster of an Austrian regiment; but most of his remaining years were employed in concert tours. He died in 1889. Of his 400 compositions, for the most part waltzes, many were very popular.

Gunnel (Centronotus), a genus of coast fishes in the Blenny family, but with more clougate eellike form than the true blennies. The British species (C. gunnellus), the spotted gannel or butterfish, is common on British coasts, lurking under stones in tidal pools. The colour is deep with a level way to bleak enter surrounded olive, with a dorsal row of black spots surrounded by white rings; the usual length is about 6 inches; the skin is thickly coated with a nucous secretion. It is seldom used except for bait.

Gunner, in the British army, is a private soldier of the Royal Artillery. Us pay is Is. 2½d. per diem, except in the Horse Artillery, where it is Is. 4d.; his uniform is blue with red facings, red stripes on the trousers, and yellow worsted lace. His arms consist of a carbine and sword-bayonet in the garrison artillery, and a cavalry sword in the horse. In the field artillery gunners carry no arms, but two carbines are strapped on to each limber. Master-gunners are warrant officers of artillery, generally placed in charge of one or more forts; the first class receive 6s., the second, 5s. 8d., and the third, 4s. 6d. a day. The office has much degenerated in importance since it was first created, at least as carly as the time of Henry VIII.

In the navy the gunner is an officer from the ranks qualified in gunnery, appointed by warrant from the Admiralty. Rank next after chief-gunner,

below second-lientenant in the army, but above master-gunner. Pay, from 5s, 6d, to 8s, 3d., with allowances in special cases. Pension, at age of fifty-five or when unfit, not exceeding £120 a year. Must pass examinations on board gunnery ships at Portsmouth or Plymouth. Uniform similar to undress of sub-lientenants, but without distinguishing marks, and with black-hilted sword.

Duties: takes charge of all the ordnance stores on board ship, and is responsible under super-intendence for their expenditure and account; has a general oversight of everything relating to the weapons employed and their proper use, either under a gunnery officer or where there is none. Is entitled to a cabin. Gunners are now sometimes appointed in place of sub-lientenants for quarterdeck duties and to command torpedo boats, &c. Chief-gunner is a commissioned officer promoted by selection from the gunners. Rank next after sublientenants in the navy and with second-lientenants nentenants in the navy and with second-lieutenants in the army. Pay, 9s. per day, and pension at fifty-five or when unit, not exceeding £150 a year. Uniform the same as ginner, but with a single gold stripe and loop on each culf, the same as subjected and loop on each culf, the same as subjected and loop on each culf, the same as subjected to the figure and guiner are eligible for promotion to the rank of lieutenant in special cases. Guiner's-mate is a first-class petty-officer, selected after exemination on leavel the guinery subjective. after examination on board the gunnery ships from men qualified as seamen-gunners. Wages the same men quanned as seamen-gonners. Wages the same as other first-class seamen petty-officers, from 2s. 2d. to 2s. 5d. per day, but with extra pay for gunuery qualifications varying from 2d. to 8d. per day. Uniform the same as other first-class seamen petty officers, but with devices on right sleeve denoting gunnery qualifications. Duties, assistant to those of gunner. Chief-gunuer's mate is a chief petty-officer, avenueted from the general materials. petty-officer promoted from the gunner's-mates. Pay, from 2s. 8d. to 3s. 2d. per day, with extra pay for gunnery qualifications. Uniform, that of other seamen chief petty-officers, but with gunnery devices on right sleeve. Duties the same as gunner's-mates. Seaman-gunner is a seaman qualigunners since summer and process on board one of the gunnery ships, for which he receives from 2d. to 4d. per day extra pay.

In the United States navy, gnuners' wages, like those of boatswains and carpenters, range from

\$700 when on leave or waiting orders during the lirst three years' service, to \$1800, when at sea after twelve years' service.

Gunnery is the science which governs by its laws the construction and employment of all firearms, though the term 'musketry' is generally applied to the scientific use of small-arms. It involves a knowledge of the properties of metals, and details of their manipulation in gun manufacture, as well as the calculation of the strains to which the weapon will be subjected, the velocities of projectiles, and the effect upon them of the various forces to which they are exposed in the bore of the gun and during their flight through the air.

This subject was first treated of by an Italian mathematician, Nicolas Tartaglia, who in 1537 published La Nuova Scientia. He also invented the gunner's quadrant. Many other writers followed him, of whom the principal was Galileo, whose Dialogues on Motion were printed in 1638. But the real founder of the science was Benjamin Robins (q.v.), whose New Principles of Gunnery appeared in 1742, and treated of atmospheric resistance, the force of gunpowder, the effects of varying the length and weight of guns, &c. His invention, the Ballistic Pendulum (q.v.), enabled the velocity of a cannon-ball to be measured, and was generally used for that purpose until super-seded by Navez's electro-ballistic pendulum about 1862. Euler, Halton, and others added by their

commentaries on Robins's work to the general knowledge of the subject which existed up to the end of the 18th century. In 1840 Professor Wheat-stone invented an electric chronoscope for measuring velocities, which was followed by those of Navez-Leurs, Bashforth, Noble, and De Boulengé. In 1878-80 the Rev. F. Bashforth produced his chronograph for measuring the resistance of the air to the motion of elongated projectiles. By means of his tables and the various instruments now placed at their disposal, mathematicians are able to calenlate the proper length, thickness of metal, size of chamber, charge, form of projectile and method of rotating it for a gan of given calibre, and also to determine the time of flight, penetration, height and velocity at any point, and elevation required for any range, &c. The latter are most necessary for any range, &c. The latter are most necessary in order that the gun may be skilfully handled, and each weapon has its 'range table' unde out,

giving these particulars.

The official Text-book of Gunnery (1887), hy
Major Mackinlay, R.A., is one of the hest modern

Informackingly, R.A., is one of the lest modern treatises on this subject, and has been largely quoted in foreign works, notably in the External Batlistics of Captain Ingalls, U.S. Artillery.

In 1880 Major F. Siacei, of the Italian Artillery, put forward a method of solving trajectories and problems in ballistics, and his formula have been used by artillerists of all nations with very satisfactory results.

factory results.

Without explaining the intricate calculations and delicate instruments used, it may be interesting to delicate instruments used, it may be interesting to give a few examples of gunnery problems. A shot was fired at Shoehuryness in 1887, and ealled the Jubilee shot, from a 9'2-inch wire-gun at an angle of 40° elevation, by which it was thought an extreme range would be obtained. The calculated range was 20,765'3 yards (say 12 miles); maximum height, 17,110'6 feet; time of flight, 63'787 seconds; auglo of descent, 58° 50'. The actual range was 20,236 yards.

The necessary elevation for a 12-inch 45-ton gun, firing with a charge of 295 lb, and a muzzle velocity

firing with a charge of 295 lb, and a muzzle velocity of 1910 feet per second at a point 3000 yards distant and 1270 feet above it, is found to be 2° 25'. An 8-ineh howitzer of 70 cwt. is to breach the escarp of a ditch 50 feet wide, with common shell and delayaction fize—the angle of descent must be 14° and the striking velocity not less than 600 feet per second; required the least necessary distance of the

second; required the least necessary distance of the howitzer from the escarp, the requisite charge of powder, and angle of elevation. Answer, 1936 yards, 6 lh. R. L. G. powder, and 13° 23′.

In designing a riflo of which the velocity is to be 800 feet per second at 1000 yards, and trajectory in no place higher than 32 feet, it is necessary to know the proportions of weight of bullet to calibre, which was found by Singer's formula to be 25% grains for are found by Siaeci's formulæ to be 358 grains for a calibre of '38 inch, or 254 grains for '32-inch

From these and similar examples it will be understeod that gunuery has become one of the exact sciences. The excellence of modern machinery enables the manufacture of weapon, projectile, powder, and fuze to satisfy the demands of the theorists, while such inventions as Watkin's position and range finders and Scott's telescopic sights put it in the power of the trained artilleryman to show equally good results in practice. See BREEGILLOADING, CANNON, RIFLE; for the School of Gunnery at Shoeburyness, see ARTILLERY.

Gunny-bags are made of a coarse jute fabric (see JUTE), and are very largely exported from India to various parts of the world. American ection is largely packed in these. They can be manufactured at a low price, hence the great demand for them. The name gunny is applied to the cloth as well as to the made-up bags. About

1850 the peasant hand-looms of Lower Bengal met both the home and the foreign demand for Indian-made gunny-bags—indeed the making of these was then the great domestic industry of that portion of India, giving occupation to men, women, and children of nearly every class. Even boatmen and domestic servants employed their spare moments At the present time the number made at the great steam-factories, of which there are now twenty-three in India, far exceeds what is pro-duced by hand-looms. For example, in the year 1835, 82,779,207 gunny-bags were exported from India, of which only five millions were woven by hand. In the same year forty millions at the hand. In the same year forty millions of these bags were sent from Bengal to other parts of India, and it was estimated that nearly as many were used in Bengal itself. The total value of the Bengal trade in jute manufactures (mainly gunny-bags or cloth) in 1885 was believed to be not far short of £3,000,000. In India gunny-bags are employed for agricultural and internal trade purposes, int many are also sent out of the country filled with grain and other produce. Cloth and bags of the same kind are made in Dundee.

Gunpowder is a well-known explosive mixture composed of saltpetre, charcoal, and sulphur mixed together in certain proportions, somewhat varying in different countries and in different descriptions

of powder.

The early history of gunpowder is very obscure; but there appears to be little doubt that the explosive nature of saltpetre (the great bulk of which comes either from India or China) when mixed with chargoal or carbon was known to the Chinese for many centuries before the Christian era. It may salpote was accidental: a wood-fire lighted on the earth where saltpetre was mixed with the soil would bring the two ingredients together, and the action of the heat would be sufficient to show the nature or property of the mixture so brought about when raised to a certain temperature. It is certain which this were known in China from very only periods; but in a pamphlet written by Colonel Omodei (Turin, 1834), and later in an article in the Athenaeum of December 26, 1868, by Captain (new Lient.-General) Henry Brackenbury, R.A., the question as to the first invention of gunpowder was fully discussed, and the conclusion arrived at was that there is great reason to doubt whether either the Chinese or any other Asiatic people invented gunpowder in its true sense, or were the first to use it as a propelling agent. It was left for more western nations to develop the discovery of the Chinese, and our first knowledge of the use of gun-powder as a military agent dates from the 7th eentury, when it was used by the Byzantine em-perors, under the name of Greek Fire (q.v.), in the defence of Constantinople against the Saracens, who, discovering the sceret of its manufacture, used it against the Crnsaders, not however as a propelling agent, but in the form of rockets or liquid fire. Its Spain, where both the Moors and Christians used some description of artillery as early as the 12th century. Roger Bacon first introduced it into Engeentmy. Roger Bacon first introduced it into eagland. Whether he discovered it independently of foreign aid, or whether he conceived the idea from ancient manuscripts, is uncertain; but the latter is the more probable, as the name first given it was craft, presumably a corruption of the word gree. Baeon's discovery dates from a period early in the 13th century, but, owing to the crude and uncertain means adopted for mixing the ingredients, it was of no practical value till the German monk, Berthold Schwarz, introduced, somewhere about the year 1320, a method of manufacture by which the ingredients were thoroughly

incorporated; the meal powder thus made was first used in England as a propelling agent by Edward III. in his war against the Scotch in 1327, the tubes from which he propelled the shot being ealled crakeys of war. The same king subsequently used cannon at the battle of Créey in 1346. From that date the From that date the use of gunpawder throughout Europe soon became general, the Russians, who in 1889 celebrated the 500th anniversary of its introduction into Russia, Queen Elizabeth by far the larger quantity of powder required by the English was obtained from abroad; but in her reign its manufacture was introduced into England. The carliest English powder-mills of which there is any record were established at Long Ditton and Godstone, in Surrey, by George Evelyn (John Evelyu's guandfather) in 1590; the Faversham mills were started soon after this date, as were also those at Waltham The mills at Faversham subsequently became the government powder-factory, and in 1787 the government also bought the mills at Waltham Abbey, which have remained in its hands down to this day. The Faversham mills were given up by the government after the peace of 1815; they were soon after bought by Messrs John Hall & Son, who still retain them.

The mode of manufacture adopted in Eugland when these several powder-mills were all thoroughly established remained practically unchanged up to within the last thuty-live years. But before proceeding with a description of the manufacture and of the different powders now in use, it will be desirable to consider very briefly the part played by the several ingredients of which gunpowder is composed, and the chemical action which takes place on ignition. The saltpetre or nitiate of potash, KNO,, acts as a magazine of oxygen, with which it readily parts when raised to a certain temperature. When the powder is fired, the oxygen of the saltpetre converts most of the carbon of the charcoal into carbonic acid, CO₂, a portion of which combines with the potash of the nitrogen is liberated. The sulphur, which performs the part of a second combustible in gunpowder, is for the most part converted into sulphuric acid, SO₃, and forms sulphate of potash. The reaction on firing the gunpowder may be expressed by the equation KO,NO₅ + S + 3C = 3CO₂ + N + KS. The heat generated by the explosion evolves a large quantity of clastic gases, the expansive power of which is greatly increased by the heat. The pressure being equal in all directions, the work done on the projectile in the bore of the gun is due to this clasticity and expansive force. The method adopted of the gun will be dealt with hereafter.

for measuring the amount of pressure in the fore of the gnn will be dealt with hereafter.

Sir Frederick Abel, C.B., F.R.S., and Captain Noble, C.B., carried out two series of most exhaustive and complete experiments on fired gunpowder, and the conclusions they arrived at were communicated by them to the Royal Society in two papers (1875–80) under the head of 'Researches on fired Gunpowder.' The results are summarised as follows: when fired in a confined space (1) the products of combustion are about 57 per cent. by weight of ultimately solid matter and 43 per cent. of permanent gases; (2) the permanent gases occupy about 280 times the volume of the original powder; (3) the tension of the products of combustion when the powder entirely fills the space in which it is fired is about 6400 atmospheres, or 42 tons per square inch; (4) the temperature of explosion is about 4000° F.; (5) the chief gaseous products are earbonic acid, nitrogen, and carbonic oxide; (6) the solid residue is

mainly composed of potassium carbonate, sulphide, and sulphiate.

From the foregoing description of the part played by the nitrate of potashit neight be thought that it would be highly advantageous to make gampowder with some nitrate containing a larger percentage of oxygen than nitrate of potassium; and as a matter of fact there are a large number of nitrate mixtures other than gampowder in which nitrate of sodium, banium, or anunonium are substituted for the nitrate of potassium. But unfortunately they are extremely bygroscopic, so that gampowder made with them would, under ordinary circumstances, soon become useless on account of the damp it would absorb from the atmosphere. In a hot dry climate nitrate of soda powders would doubtless be valuable, besides being much cheaper to manufacture than nitrate of potash powdens; indeed such powders were used to a considerable extent in the construction of the Snez Canal; but, as these powders are not in general use, it is unnecessary to refer to them further.

Process of Manufacture.—The method of manufacture of gampowder at the Royal Gunpowder Pactory at Waltham Abbey (fully explained in the official handbook) may be briefly described. As in all other explosives, it is essential that the ingredionts of which the powder is composed should be as pure as possible. The selection and preparation of the charcoal is of the greatest importance; for, without change in the proportions of the components, the properties of the gnupowder are capable of great variation from the quality of the charcoal used in its manufacture. The ingredients are first reduced to a fine powder by guinding. They are then mixed by hand in the proportion of 75 per cent by weight of saltpetre, 15 of charcoal, and 10 of sulphin, and are next throughly incorporated in a west state in a powder-mill into a cake called in a wet state in a powder-mill into a cake called a mill-cake. This cake is then broken down between copper-plates into meal. From this meal-powder all granulated powders are made. The meal is compressed in a press-lox, the amount of compression it undergoes being dependent on the density of powder required. After compression the press cake is broken into pieces ready for granulating, which is done in the granulating machine, the powder passing between gnn-metal rollers till it is broken into grains of the required size, different powders being made to pass through sieves whose meshes are of the size of the grain required. There is a considerable amount of dust formed by the granulating process, so that after granulating it is necessary to dust the powder previous to glazing it, which is the next operation. It is glazed in glazing drums, which, revolving rapidly, impart a glaze to the powder simply by the friction set up. The powder is now stoved or dried in copper-trays in a drying room, which is heated to a temperature of about 100° F., and the powder is left in this room from one to two hours according to the amount of moisture that it contains. Formerly all powder was granulated, but the enormous increase in the size of the guns now used necessitated the introduction of other descriptions of powder—viz. cut and moulded powders. In the ent powders, after the process of pressing, the press-cake, instead of being granulated, is first cut into strips, and these strips are then ent into cubes, and the powder so made is called cubical or pebble pawder; there are at present two sizes—viz. §-inch and la-inch cubes. In the moulded powders, as is implied in the name each grain or piece of powder is moulded or pressed in a separate mould. This is done in a hydraulie machine. The exact quantity of granulated powder required to form each prism is deposited in a block containing sixty-four moulds; the powder in these

moulds is then pressed by plungers exactly fitting This powder is called *prismatic powder*, the grains or pellets being in the form of hexagonal prisms nearly I inch in height and about 1½ inch across, with a hole in the middle about 1½ inch of an inch in diameter, the object of which will be explained later on. There are two descriptions of prisms in a prismatic powder. prismatic powder—black and brown. The proportions of ingredients in the black powder are the same as in all other English military powders; but in the brown powder the charcoul is made from straw, instead of from wood, and the propertion of the ingredients are as follows: viz. saltpetre 79, charcoal 18, and sulphur 3 per cent.

Gunpowder more nearly fulfils required in a propelling agent than any other explosive hitherto discovered. These objects are (1) a maximum muzzle velocity with even and low pressures; (2) uniformity of action, so that the same results may always be expected; (3) freedom from feuling; (4) durability—i.e. that it is not liable to injury in transport, and that its condition

does not materially alter when stored.

The advantages of gunpewder over other explosives are (1) that, the rate of combustion being gradual, the explosion is not so severe on the bore of the gnn as in the case of more violent explosives; (2) the ingredients of which it is composed are easily produced and are cheap; (3) it is, with proper precautions, safe in manufacture, in store, or in transport. Experiments made by the Explosives Committee have shown that any alteration in the proportions of the ingredients has not so great an influence on the 'explosiveness' or rate of burning as the density, hardness, size, and shape of grain and amount of glaze. The density of grain has an important effect on the rate of burning. By absolute density is meant the amount of powder actually properly in a captally in its different absolute density is meant the amount of powder actually present in a certain bulk—i.e. if different quantities of meal-powder, containing an equal amount of moisture, be pressed into cakes of the same size, that which contains the most meal will be densest; then, if these cakes be ignited simultaneously, the cake which has the least density will be the first to be completely burnt. Hardness does not depend on density; increased bardness is given by pressing the meal in a moister hardness is given by pressing the meal in a moister condition. Size and shape of grain are also important characteristics to be considered in connection with the explosiveness of powder. Other things being equal, a larger-grained powder burns slower than a smaller-grained; and in grain of equal weight that which has the largest surface will burn the context. the quickest A highly-glazed powder, again, burns slower than an unglazed one, probably because the glaze somewhat retards its thorough ignition. The temperature at which powder ignits waries from 530° to 600° F., according to the nature of the powder, the finest sporting powder igniting at the higher temperature.

It is only of late years that all these points have received the attention they deserve, but they have been forced upon the authorities by the necessities of the times. As seen as ships began to be plated with armour, guns had to be made which could throw a projectile capable of piercing that armour; and as the armour increased in thickness so did the guus increase in size and pewer, threwing heavier projectiles, which necessitates an enormous powder charge to propel the shot. In former days there was a beautiful simplicity about powder. Practically there were but two kinds, enc for muskots called fine grain or F.G., and the other for eannen called large grain or L.G., and no particular attention was paid to the quality; it was certainly not subjected to the searching proofs and tests which all pewders made in these days have to undergo.

The first improvement in powder took place on the introduction of rifled arms, when a rifle fine-grain powder or R.F.G., slightly larger in the grain than F.G., and a rifle large-grain powder or R.L.G., the grains of which were about twice the size of those of L.G., were introduced for small-arms and cannon respectively. The R.F.G. powder was improved and made of a rather smaller grain, the size of grain being from 1'th to 25th of an inch, on the introduction of the Martini-Henry ride, and this powder, knewn as R.F.G.2, has not since been as the fact of the pewder then in existence in England; but as the guns were made larger and larger it became necessary to use a slower burning powder, which led first to the introduction of R.L.G.², having grains varying in size from 3 to 6 to the inch; that is, the grains must pass through a sieve of 3 meshes to the inch, and must not pass through one of 6 mashes to the inch. A short time afterwards a still larger powder called R.L.G., with grains of nearly half an inch in size, was introduced. This was soon followed by pebble powder, a still further development of R.L.G., for guns of large calling for which R.L.G. was net suitable. The list pattern of pubble or P. powder was cut in cubes of about half an inch in size, and a second pattern or with rounded edges. Both these powders have a density of 1.75, whereas that of the R.L.G. powders is 1.65. Noxt in order came the prisumatic powders. of which there are two descriptions—viz prismatic black or Prism¹ and prismatic brown or Prism¹ bnown, a description of which has been given under the head of manufacture. There are two other powders of a special pattern which may be mentioned—viz. M.G.¹ which is used only in the 1-inch Nordenfelt machine gun, the size of grain of which is considerably larger and of more even size than that of R.F.C.²; and Q.F.¹, a powder which at present is used only in the 3- and 6-pounder quickliving guns, the size of grains being about half an inch square by about 1% of an inch thick.

The pawders of other nations differ but slightly from those manufactured in England; the method but the

of manufacture is the same in principle, but the proportions of the ingredients vary to a slight

degree in every nation.

Itaving now described the various powders in use, it remains to say a few words about velocities and pressures. The great desideratum with all firearms is to obtain the maximum velocity with the minimum of pressure, and in the experiments and investigations carried out by the committee on explosives, and by Sir F. Abel and Captain Noble, this end was kept in view. It has already been pointed out that the rate at which powder burns depends greatly on the density, hardness, size, and shape of grain: the greater the density the slower it will harn; the larger the grain the slewer it will burn, simply because the amount of lighting surface is reduced in proportion to the volume; and the smeother the surface of the grain the slower it will burn for the same reasen. A powder therefere composed of, comparatively speaking, small grains of irregular size and shape, hums very rapidly, and generates a large volume of gas suddenly, thus setting up a very high pressure in the bere of the gun. In some of the experiments of the committee the pressure recorded in the bore of the gun was as high as 60 tons to the square inch; but, as Captain Noble had previously discovered that the maximum pressure of powder fired in a con-fined space did net exceed 42 tens, this extra pres-sure could only be due to wave-action, a sudden

evolution of gas locally causing a vibratory motion of the gas. This led to the introduction of largerof the gas. of the gas. This led to the introduction of larger-grained powders, so as to retard the burning of the charge, but this did not entirely do away with the wave pressure. It was next sought to diminish the pressure by giving air-space to the charge, as it was found that the density of the charge—not the density of the grain—materially affected the pressure; this air-space was given by enlarging the chamber of the gun, and although it became necessary to increase the charge so as to maintain the same muzzle velocity, it was found that the pressure was sensibly diminished.

But whilst Great Britain was still adhering to pebble powder, other nations had adopted a prismatic powder with a hole through the centre of the pellets or prisms. The idea of this of the pellets or prisms. The idea of this perforated powder is due to General Rodman, an American artillery officer, who thought that by gas at a more uniform rate. In a charge composed of solid grains, the grains being lighted on the surface and burning towards the centre, the surface giving off gas rapidly decreases, and therefore the volume of gas given off by the grain will be greatest when the charge is first fixed, and will rapidly fall off; hence the maximum pressure on the bore of the gun is set up almost before the projectile commences to move. To overcome this, the idea occurred to General Rodman to have a hole through each large grain or pellet of powder, so as to give the grain an interior as well as an exterior lighting surface, so that as the exterior lighting surface inereused, thus preserving the ignited surface more uniform during the burning of the pellet, and therefore keeping up a more constant evolution of gas. This tends to distribute the pressure more uniformly along the bore of the gun, and increases the initial velocity of the projectile. The Russians in 1860 were the first to adopt this plan, followed by the Germans, the English being the last to take it up; it is now, however, adopted for the heaviest guns in the English service, the charge being built up of the hexagonal prisms already described, so arranged that the holes through each column of prisms shall be continuous from one end of the charge to the other. The introduce the continuous from one end of the charge to the other. The intro-duction of this powder has enabled the type of gun to be entirely altered; a description of the guns now in the service will be found under the head of Cannon, Rifles (q.v.). We are indebted to the Germans for the invention of brown or cocoa powder; it is claimed for this powder that it gives a higher initial velocity with less pressure than the same charge of black powder.

The same charge of black powder.

The same principles as have been ennuciated here with regard to guns should govern the selection of powder for mining or blasting purposes. If it is desired to shatter a mass of rock, a very violent quick-burning powder, having a great disruptive force, should be used; but if it is only desired to dislodge, say, a mass of coal without shattering it, danser shower lawning powder should be chosen. a denser, slower-burning powder should be chosen.

The instrument generally used for taking velocities is a chronograph, the invention of Major De Boulengé of the Belgian Artillery. It eonsists of a brass column supporting two electro-magnets. No. 1 electro-magnet supports a long cylindrical rod, called the chronometer, covered by a zinc tabe; No. 2 electro-magnet supports a shorter rod. Two screens of copper wire are placed at certain fixed distances in front of the gun. No. 1 electro-magnet is magnetical table. nutzzle of the gun. No. 1 electro-magnet is magnetised by the current passing through the first screen, and No. 2 by the current passing through the second screen. As the shot passes through the first screen the current is broken, and the rod or

chronometer suspended by No. 1 electro-magnet falls by gravity. Similarly, when the shot passes through the second screen, the shorter weight suspended by No. 2 electro-magnet falls on to a disc, which, pressing a spring, causes a knife to be re-leased, and this, darting forward, strikes the chronometer in its fall, making an indent in the zinc tube. The distance of this indent from the zero point being measured off on a scale specially graduated for the instrument gives the velocity of the shot between the two screens, from which can be calculated the muzzle velocity. Another scale gives the time of flight.

The pressures in the bore of the gun are calculated by means of a crusher gauge. A small copper cylinder is inserted in the gange, which is screwed into the gun at that part where it may be desired to measure the pressure. The copper cylinder is measured before and after the discharge of the gun, the amount by which it is shortened by the force of the explosion being the measure of the force or pressure, exerted. The actual pressure force, or pressure, exerted. The actual pressure in tons to the square ineh is calculated by means of a mathematical table prepared for different coppers. See Handbook of Gunpowder and Guncotton, by Major-general W. H. Wardell; A Dictionary of Explosives, by Major Candill, R.A.; and a Handbook to Modern Explosives, by M. Eissler (1889). For Smokeless Gunpowder, see Gun-cotton; and for laws relating to gunpowder, see Explosives. see EXPLOSIVES.

Gunpowder Plot. This plot was an attempt on the part of a small number of Roman Catholic gentlemen to destroy by gunpowder King James I. and the Houses of Lords and Commons on the day of the opening of parliament, November 5, 1605. The design originated in the busy brain of Robert Catesby (q.v.), who had already suffered for the part taken by him in Essex's plot. He and his fellow-conspirators were driven to desperation by the faithlessness of James, who before his accession had led the Catholies to expect some measure of toleration, but soon afterwards put in full force the penal laws against popery, and showed a disposition to increase rather than to mitigate their rigour. Early in 1604 Catesby communicated his plan to John Wright and Thomas Winter. Guy Fawkes (q. v.), a brave soldier serving in the Spanish army, was brought over from Flanders, and together with Perey was admitted to the plot after taking an oath of secrecy. All five then received communion from the hands of the Jesuit Gerard, who, however, was not informed of the conspiracy. On 24th May Percy hired a room adjoining the Parliament House which they intended to underthe rariament House which they intended to undermine. The adjournment of parliament from time to time caused sundry postponements of the work. In December the digging was begun. The difficulties were greater than was expected, and it became expedient to call in the assistance of fresh associates—John Grant, Robert Winter (brother of Winter) and Paissociates—To the Catally. In the Thomas), and Baics, a servant of Catesby. In the following March the conspirators were able to hire a convenient cellar immediately below the House of Lords. The mine was now abandoned, and the cellar was stored with casks of powder, covered with faggots.

All was ready by May. Money was now wanted to provide men, horses, and arms for the insur-rection, which it was intended should break out in the midland counties, where the chief conspirators had congregated. So about Michaelmas some rich Catholics, Sir Everard Digby, Ambrose Rookwood, and Francis Tresham were induced to join. Tresham lacked the courage and fanaticism of his fellows. Wishing to save his friend Lord Mouteagle, he wrote to him on Saturday, October 26, a mysterious letter, which was shown to Lord Salis-

bury and led to the discovery of the plot, if it had not otherwise been already betrayed. The names of the conspirators were, however, not disclosed. The government, therefore, waited for the fuller development of the plot. The cellar was visited as if casually by the Lord Chamberlain and Lord Monteagle at three o'clock on the afternoon of the Fawkes, who was found there, explained that the finel and fagguts were the property of his master, Percy. He still hoped to carry his design into excention, and a little before midnight he returned to the cellar to take up his post for the night. He was met and arrested at the doorway. Cateshy hastened to Warwickshire, hoping to raise his friends. A few days later they were attacked; several of the conspirators, including Catesby, were killed, and others were taken prisoners and committed for trial. From their confessions the whole

plot was gradually revealed.

The government was now much concerned with a suspicion that the murderous design had been promoted or approved by the Jesnits. Bates had in noted or approved by the Jeshits. Dates late in his confession implicated certain fathers of the society, especially Garnet (q.v.) and Greenway. The latter made good his escape abroad. Garnet and a brother Jesnit, Oldcorne, who was convicted of nothing more than adding in the concealment of his companion, were discovered in a priest's hidingeminamon, wore discovered in a priest's inding-place at Hendlip, whither Garnet had fled from Coughton, in the neighbourhood of the appointed rendezvous of the conspirators. Their tital ex-cited the greatest interest. It soon became evi-dont that Garnot's knowledge, such as it was, of the plot had been forced upon him by the conspirators, who were anxious to obtain from him some token of his approval for the satisfaction of their own doubtful consciences. He admitted that he had derived a general knowledge of some treasonable design against the government, in the first instance from Catesby, and that subsequently he had learnt the particulars from Father Greenway in confession. On further examination Garnet expressed some doubt whether the communication made by Greenway was strictly sacramontal or under the seal of confession, or at least whether Greenway himself so considered it. It was, moreover, elicited from Garnet that he had frequent conversations with Greenway on the plot, though always 'in relation to confession.' Finally, when Catesby wished to give him full information out of confession—information which would have released Garnet from all shadow of scruplo in taking measures to reveal or provent the crime—the Jesuit refused to listen to him. Some of Garnot's actions, both before and after the 5th November, gave probability to the belief that he knew more than he admitted, and was not unwilling that the plot should succeed.

He blamed himself, indeed, for not having done more to provent the mischief, and declared that he should suffer, not as a martyr, but as a penitont thief,

thief.
It is, however, clear that the clergy in general, whether secular or regular, and the entire Catholic community, with the exception of a score of fanatics, were innocent of all participation in the plot. An impartial and masterly treatment of the facts, especially in reference to the degree of gnilt to be attached to Garnet, will be found in the Narrative of the Gunpowder Plot, by David Jardine (1857), with which should be compared chap. 6, vol. i. of Gardiner's History of England, and vol. ii. of Tierney's edition of Dodd's Church History.

History.

Güns (Magyar Köszeg), a free town of Hungary, 57 miles SSE. of Vienna, with a castle of Prince Esterházy. Pop. 7305.

Gunshot Wounds. See Wounds.

Gunter, EDMUND, mathematician, was born in Hertfordshine in 1581, and educated at West-minster and Christ Church, Oxford. Although he took orders and became a preacher in 1614, his mind was strongly bent towards mathematical studies, and in 1619 he obtained the professorship of Astronomy in Gresham College, London, a post which he held down to his death, 10th December 1626. His principal works are the Canon Triangutorum (Lond. 1620), a table of logarithmic sines torum (Lond. 1620), a tame of logarithmic sines and tangents to seven places of decimals, being the first table published in accordance with Briggs's system, and treatises on the Sector, Cross-staff, and other Instruments (1624). Gunter was the first to use the terms cosine, cotangent, and cosecant for the sine, tangent, and secant of the complement of an arc. To him are also due the eomplement of an alc. 10 mm are also due the invention of the surveying chain (see Chain), a quadrant, and a scale, and the first observation of the variation of the compass.

The name of Gunter's Scale, or Gunter's Lines, is usually given to three lines to be seen on almost any sector, and marked N, S, T, meaning the lines of logarithmic numbers, of logarithmic sines, and of logarithmic tangents. To understand their construction and use requires a knowledge of logarithms; they are explained in every school-book of practical mathematics. The distances of the divisions modes? mathematics. The distances of the divisions marked 1, 2, 3, &c. on the line of log. numbers, represent the logarithms of those numbers—viz. 0, 301, 477, &c.—laken from a scale of equal parts. The other lines are constructed on an analogous plan. Calling to mind that multiplication of numbers is effected by the addition of the logarithms, division by their subtraction, involution by their multiplication, and evolution by their division, we are able to perceive with what case many rough problems in areas, hoights, cubic contents, and other matters may be performed through the agency of Gunter's Scale.

Guntur', a town in the presidency of Madas, 46 miles WNW. of Masulipatam, with an active trade in grain and cotton. Formerly badly built and overcrowded, it has been recently much im-

proved. Pop. 19,646.

Gurgaon, a district of the Punjab, in the division of Delhi, with an area of 1938 sq. m. Pop. (1881) 641,848, over two-thirds Hindus. Agriculture is the chief employment; the soil is on the whole not unfertile, but there is little artificial irrigation, and the district has suffered greatly from drought, The commercial centre is Rewari (q.v.); the civil headquarters is Guignon (pop. 4000), 21 miles SW. of Delhi by rail, with some trade in grain.

Gurhwal. See GARHWAL.

Gurjun Balsam, or WOOD-OIL, a balsamic Gurjun Balsam, or Wood-oil, a balsamic liquid obtained from one of the Dipteraces (q.v.), which grows plentifully in the Andaman Islands. It resembles in characters and medicinal proporties Capaila Balsam (q.v.), and has at various times been sold as such. It has been used as a substitute for copaiba, ehiclly in the Indian hospitals, but its chief use in the East is as a varnish for boats, and for preventing the attacks of ants ou timber. At the request of Mr Manley ants on timber. At the request of Mr Manley Hopkins, the Hawaiian consul, the English governmont procured from the government of India in 1888 a large quantity of guriun-oil, for checking or alleviating leprosy in Hawaii. It was used for this purpose by the late Father Damien (q.v.) amongst the lepers of Molokai.

Gurnall, William, theological writer, was born in 1616 at Lynn, in Norfolk, was educated at Emmanuel College, Cambridge, and in 1644 became rector of Lavenham in Suffolk, where he died, 12th October 1679. He is known as author of the devout, quaint, and pithy somnons on Ephesians, chap. vi., cntitled The Christian in Complete Armour: a Treatise of the Saints' War against the Devil (1655-62; see the cd. of 1865, with biography by Ryle).

Gurnard (Trigla), a genus of acanthopterons fishes of the family Cottide, represented in tropical and temperate seas by about forty species, of which seven occur on British coasts. The head of the gurnard is angular, the coes near the summit, the upper surface and the sides entirely bony, the teeth small and very numerous. The body is rounded, tapering, and covered with small scales; the air-bladder is often in two lateral parts provided with lateral muscles, and the broad pectoral fins are usually brightly colouned on the inner surface. The most marked peculiarity of the genus is the presence, in front of the pectorals, of three free finger-like rays. These are well supplied with nerves, and are organs at once of locumotion and of touch. Most of the gurnards live near the bottom, and feed on crustaceans, molluses, and small fishes. When handled they emit a peculiar sound caused by the escape of air from the air-bladder—a fact which has gained for one species (T. lyra) the local name of 'Piper.' The most common British species is the Gray Gurnard (T. gurnardus). Its colour is brownish-gray, marked with white, and the lateral line bears a series of white, crested, bony plates. The Red Gurnard (T. pini) is also common, and is much used as food. It attains a length of about



The Sapphirine Gurnard (Trigla hirundo).

15 inches. Much rarer is the Sapphinine Gurnard (T. hirundo), so named from the beautiful blue of its pectoral lins. It grows to a length of about 2 feet. Gurnards are caught by the trawling-net or by hook and line.

Gurney, Joseph John, aphilanthropic Quaker, born at Earlham Hall, near Norwich, August 2, 1788, was educated privately at Oxford, and in 1818 became a minister of the Society of Friends. His life was devoted to the prosecution of benevolent enterprises, including the prison reforms of his sister, Mrs Elizabeth Fry. He died Jannary 4, 1847. Among his numerons works are Notes on Prison Discipline (1819), Observations on the Religious Peculiarities of the Society of Friends (1824), and A Winter in the West Indies (1840).

Gustavus Adolphus (Gustavus II.), king of Sweden from 1611 to 1632, was born at Stockholm, December 9, 1594, the son of Charles IX., and grandson of the great Gustavus Vasa. He was carefully educated, and grew up one of the most accomplished princes of his age. He knew eight languages, speaking and writing live of these with fluency, was well read in the elassics and ancient history, proficient in music, and skilful in all manly exercises. When he came to the throne in his eightcenth year he found the country involved in wars abroad and disorders at home, arising from the disputed succession of his father, who had been elected king to the exclusion of the direct heir, his nephew, the Roman Catholic Sigismund, king of Poland. The first act of Gustavus was to secure the hearty co-operation of the nobles, by confinning their privileges subject to the performance of military service to the crown. Having reorganised the internal government, and raised both men and money, he made war on Dennark, and soon recovered his Baltic provinces, and a direct ontlet towards Russia. His war with Russia was ended in 1617, by the treaty of Stolbova, by which Sweden obtained supreme dominion over Ingermanland and Karelia, and part of Livonia, while Russia recovered Novgorod and all other conquests made by the Swedes. In 1618 Gustavus visited Berlin in secret and fell in love with the strong-minded daughter of the Elector of Brandenburg, whom two years later he married. On that second vicit in 1620 he traversed Gennany as far south as Heidelberg. He next turned more actively to the intermittent dispute with Poland, which was at length terminated in 1629 by a six years' truce, which secured reciprocity of trade and freedom of religion to the natives of both countries, and left Gustavus master of Elbing, Braunsberg, Pillan, and Mennel.

This peace enabled the king to matnie the plans he had long cherished in regard to Germany, and accordingly, after making various administrative reforms at home, he remitted the charge of the government and the care of his infant daughter Christina to his chancellor Oxenstiern, and crossed to Pomerania about the midsummer of 1630, with but 15,000 men, to head the Protestants of Germany in their hand stringele against the Catholic League, which was backed by all the power of the empire and the resistless arms of Tilly and Wallenstein.

Everything favoured the success of the Swedes, who drove the imperialists from Pomerania, and took Stettin. The Duke of Pomerania, the aged Bognslav, last of the old Wendish line, engaged, in return for Swedish aid, that the dukedom should, after his death, be given up to Sweden until the expenses of the war were fully repaid; whilst Richelicu promised Gustavus a substantial subsidy as long as he maintained an army of 36,000 men. The Emperor Ferdinand had been obliged by the Electors to dismiss the imperious Wallenstein from his service. But, while the Swedes were besieging Spandau and Kustrin, the rich city of Magdeburg, which had applied for help to Gustavus, who could not move without the support of the hesitating Electors of Brandenburg and Saxony, was taken by Tilly. His troops perpetrated the most terrible atnocities upon the citizens, and all the buildings were burned to the ground save the cathedral alone. The Protestant German princes had heen slow in coming in to Gustavus; but after John George of Saxony was driven into his arms by the impolitic demands of Ferdinand, Gustavus came more and more to be identified as the champion of their religion against oppression. Meanwhile the unselfishness of his own aims and his elevation of character, as well as the admirable discipline and the conduct of his hardy veterans in such strong contrast to the ungoverned license of the imperial troops, gained the confidence and admiration of all Germany. Soon after the fall of Magdeburg, Gustavus inflicted a severe defeat on Tilly at Breitenfeld, which taught the Catholies to fear the 'snow-king and his body-

guard,' as they designated Gustavus and his small army. The king now advanced into Franconia, and, after allowing his army to recrnit their strength in the rich bishopries of Wurzburg and Bamberg, took the Palatinate and Mainz, where he held a splendid court, surrounded by numerous princes and ambassadors. In the April of 1632 the Swedes, in the face of Trlly's army, crossed the Lech and gained a decisive victory, whence Tilly was carried to Ingolstadt to die. From thence the march to Manich was one continued trimmph, and wherever Gustavus appeared he was received by the populace as their guardian angel. The road to Vienna was now open to him, and the fate of the emperor would have been sealed had the latter not recalled his hanghty general, Wallenstein, who, having accepted office on his own terms, gathered together a large and heterogeneous army of 60,000 men, and advanced on Nmemberg, where he entremehed himself strongly. After withstanding a desperate assault of the Swedes he was obliged to retire into Thuringia. the swedes he was obliged to rethe into Thirmight. The unfavourable season, the bad roads, and the cantions dispositions of Walleustein hindered Custavus from attacking the imperialists as soon as he intended, but on November 6, 1632, the two annies came finally face to face at Lutzen, ten miles to the south west of Luipzig. A thick fog lay close upon the ground. The Swedes for the south west of helping. A then for lay close upon the ground. The Swedes gathered to morning prayer to the music of Luther's noble hymn, 'Eine feste Barg ist muser Gott.' About cloven the mist cleared off, and Gott.' About eleven the mist eleared off, and Chstavus gave his last orders to his generals. Waving his sword above his head he cried 'Forwards,' and rode to meet the enemy at the head of the cavalry on the tight wing. His eager troops soon broke the imperial lines, but Wallenstein bringing up his reserves drove back the Swedish infantry in the centre. Gustavus hastened too cagorly to the resenc, and, in the thick fog which had again descended, was separated from the cavalry he had ordered to follow him, and rode almost alone into a sanadron of Groats. A shot almost alone into a squadron of Croats. A shot passed through his horse's neek, another shattered his left arm, a third struck him in the back, and up asked who was there. If was the king of Sweden,' nurmured the dying king, whereupon the soldier shot him through the head. Bernhard of Weimar took up the command, while on tho of wemar took up the command, while on the enemy's side Pappenheim's cuvalry came up to take their part in the battle. The Swedes burned to revenge their king and fought with a fary that was irresistible. Hour after hear the battle swayed uncertainly, till at length, when Pappenheim had fallen and his artillery had been taken, Welleystein draw his weather field and hele Wallenstein drew his men off the field and left their hard-won victory to the Swedes. The body of Gustavus was recovered and laid to rest in the Riddarholm church at Stockholm.

So fell the great hero of the Thirty Years' War, and with him perished all hope of a speedy onding to the fatal struggle, and the establishment of a durable peace in Germany. His Corpus Evangelveorum was a noble imagination, and would have built up a Protestant power around the shores of the Baltic so strong as to defy all attack. But it is more than probable that a foreigner even so disinterested as himself might have failed to overcome the instinctive cohesiveness of even a divided Germany, and if so, he was happy in the accident of death on the field of victory, leaving behind bim a neble memory unstained by wrong, and a deathless glory undimmed by failure. See J. L. Stevens, Memoir of Gustavus Adolphus (1885); Archhishop Trench, Gustavus Adolphus in Germany (new ed. 1886); and other works cited at Thirty Years' War.

Gustavus Vasa (Gustavus I.), king of Sweden from 1523 to 1560, was born in 1496, of a noble

house closely allied to the Sture family, his own family name being Ericson. Still a boy, he became involved in the patriotic struggle with Christian of Denmark, and was treacherously carried off to Denmark, there to be kept in confinement with other nobles as hostages. a year he escaped in disguise to Lubeck, thence to Sweden, where he went about from place to to Sweden, where he went about from place to place striving, with great danger to himself, and with but little success, to rouse up a spirit of resistance against the Danes. At length he had to retreat to Dalecarlia, where he wundered for several months, in poverty and disgnise, with a price set on his head, working with his liands on the farms and in the mines. At last the infamous 'Blood-bath' of Stockholm (1520) roused the slumbering fury of the Swedes, and gave Gustavus the opportunity he longed for. The hardy miners of Dalecarlia mustered round him, and ore long he had an anny lange enough to attack and ere long he had an army large enough to attack the enemy. One by one the strong places fell into his hands, and the capture of Stockholm in 1523 finally drove the Dunes from the soil of Sweden. Thus fell the great Scandinavian union which had survived the treaty of Calmar (1397) for 126 years, At the diet of Strengmas that sume year Gustavas was elected king. Thenceforward he strong with unceasing zeal to heal the wounds of his unhappy country. He found the peasantry restless and disaffected, the Romish elergy wealthy, compt, and unpatriotic, the Lutheran party too eager to push their dogmas by force, and the whole country languaged without request to large architics. demonalised without respect to law or religion. Yet after forty years' rule he left Sweden a penceful and civilised realm, with a full exchequer, and with a well-organised army of 15,000 men and a good fleet—both his own elections. He promoted trade at home and abroad, fostered schools and colleges, made commercial treaties with foreign nations, made commercial treatics with foreign nations, and established fairs for foreign tradets, while he opened up roads, bridges, and canals throughout the country. In his relations with his subjects (Instavus was firm, and sometimes severe, but seldom unjust, except in his dealings towards the Romish clergy, whom he despoiled with something like rapacity of all their lands and funds. On the other hand he did much to promote the cause of Lutherauism; although he took care that the reformed clergy should be dependent on the crown. reformed clergy should be dependent on the crown, and enjoy only very moderate emoluments. To him the Lapps were indebted for the diffusion of Christianity among them by Lutherna missionaries; the Finns for the first works of instruction parts of the Bible and hymn-books printed in their own language. Gustarus was mothodical, just, moral, and abstemious in his mode of life—his character altogether admirable but for a touch of avarier. He was three times married, had ten children, and died 20th September 1560, his eldest son, Eric, being his successor according to the treaty of Westeras (1544), which made the crown hereditary. The best memoir is that by Fryxell—Ger, trans. Leben and Thaten Gustars I. Wasa (1831). See also Alberg's Gustavus Vrsa and his Stirring Times (Lond. 1882), and Paul Baron Watson's book, The Swedish Revolution under Gustavus Vasa (1889).

Gustavus III., king of Sweden, was born in 1746, and succeeded his father, Adolph Frederick, in 1771. At that time Sweden was ruled by an oligarchy of the nobles. The first task Gustavus set himself after his accession was to break their power and bring the supreme anthority into his own hands; and this task he accomplished by means of a feigned revolt. Being of an energetic temperament and possessing a considerable share of political sagacity, Gustavus now labouted haid, and laboured successfully, for the progress of his

country, eucouraging agriculture and bettering the lot of the peasantry, fostering commerce, mining, literature, and science, e-pecially medicine, ordering the finances, digging canals, and building hospitals, orphanages, and workhouses. But he had an inordinate love for things French, and, in his endeavour to imitate the extravagance and splendour of the court of Versailles, he became embarrassed for money. His attempts to overcome this embarrassment by an increase of taxation alienated from him the affections of his people. Of this state of things the nobles took advantage; they thwarted the king's designs in his war with Russia, and endeavoured to recover the power they had lost (see SWEDEX). And, though Gastavus once more broke their opposition and made himself full master of his kingdom, an ill-advised scheme for employing the forces of Sweden in behalf of Louis XVI. of France against the storm of the Revolution led to his own assassination by Ankarstrom, an emissary of the oligatehical party, at Stockholm in Mauch 1792.

Gustavus IV., king of Sweden, son and snecessor of Gustavus III., was born 1st November 1778. During the four years of his minority, his uncle, the Duke of Sodermanland, acted as regent (1792-96). This king was altogether unlitted to rule a kingdom, owing to his crotchety notions of honour, his obstinate self-will, his exalted ideas of the prerogatives of kingship, and his want of tact and wisdom in the management of public affairs. The ruling principle or motive of his life was hatred of Napoleon. In consequence of this feeling he offended Russia by preferring the alliance with England, lost Stadsund and Rugen to the French, and Fuland to the Russians in 1808, made an unsuccessful attack upon Norway, and finally insulted the English by his treatment of an army corps that had been sent to his assistance. In March 1809 the whole of Sweden was in a condition of burning discontent, and a party of nobles, acting in conjunction with the army, dethroned their wholly unpopular soveneign and gave the crown to his nucle, the Duke of Sodermanland, who succeeded as Charles XIII. Gustavus spent his last days abroad, chiefly in Switzerland, often in great want, and died at St Gall, 7th February 1837.

Gistrow, a town of Mecklenburg-Schwerin, 70 miles E. by S. of Lubeck by rail. It has a eastle (1558-65), a church of the 13th-15th century, and a noticeable pauper school and orphanage, with breweries, non-foundries, a sugar-factory, tileworks, and a large wool market. It was for nearly a century and a half (1555-1695) the residence of the dukes of Mecklenburg-Gustrow. Pop. (1875) 10,923; (1885) 13,119.

Gut, a term technically used in zoology as equivalent to the enteron or alimentary canal. Three parts have to be carefully distinguished: (a) the fore-gut or stomodeum, lined by the outer layer or ectoderm, and formed from an anterior infolding or invagination; (b) the mid-gut or mesenteron, lined by the inner layer or endoderm, and formed from the original gastrula cavity; and (c) the hind-gut or proctodeum, lined by the outer layer or ectoderm, and formed from a posterior invagination. These three typical parts, thus distinguished according to their origin, vary greatly in size and function in different classes; but the mid-gut is the most important on account of its digestive function and because of its outgrowths (liver, &e.) in higher animals. It must also be noted that in vertebrate anatomy the pharynx, gullet, and stomach are sometimes called fore-gut; the small intestine, mid-gut; the large intestine, hind-gut; but embryologically these are all parts of the mesenteron

defined above. Sec Embryology; and for the gut manufacture, Catgur.

Gutenberg, Johannes, or Henne, who is regarded by the Germans as the inventor of the art of employing movable types in printing, was born about 1400 at Mainz. His proper name was Gensfleisch, or Gansfleisch, but he adopted his mother's family name instead. In 1434 he was living in Strasburg, and seems to have been well known as a man of considerable mechanical skill, who taught stone-cutting, mirror-polisbing, and similar arts. When and where he made his first attempts in the art of printing cannot with certainty be ascertained. Some time between 1444 and 1448 he returned to Mainz, where, in 1449 or 1450, he entered into partnership with Johannes Fanst or Fast, a wealthy goldsmith, who familished the money required to set up a printingness. This partnership was, however, dissolved after the lapse of a few years (1455), Fanst bringing an action at law against Gutenberg to recover the sams be had advanced. In consequence of the legal verdict Faust retained the printing concern, and carried it ou in conjunction with Peter Schoffer of Gernsheim. Gutenberg, with the assistance of a Dr Honney, afterwards set up another printingpress, with which he worked on till the date of his death, 1468. For authorities and an account of the invention controversy, see Printing.

Guthrie, Samuel, an American chemist, was born in Brimfield, Massachusetts, in 1782. He deserves motice as one of the original discoverers of Chloroform (q.v.), which he termed a 'spirituons solution of chloric ether.' His process was tested as early as 1831. He died at Sackett's Harbour, New York, 19th October 1848.

Guthrie, THOMAS, D.D., an eminent pulpit and platform orator, philanthropist, and social reformer, was born July 12, 1803, at Brechin, Forfarshire, where his father was a merchant and banker. He studied eight years for the ministry at the university of Edinburgh, and devoted two additional winters to the study of chemistry, natural history, and anatomy. Meanwhile he natural history, and anatomy. Meanwhile he was licensed as a preacher by the presbytery of Brechin in 1825. He subsequently spent six months in Paris, studying comparative anatomy, chemistry, and natural philosophy, and walking the hospitals there. Returning to Scotland, he for two years conducted, on behalf of his family, the affairs of a bank agency in Brechin. After waiting for five years for a presentation to a living, he had almost resolved to abandon the clerical profession when, in 1830, he received a presentation from the crown to Arbirlot, in his native eounty; and in 1837 was appointed one of the ministers of Old Greyfrians panish in Edinburgh. Here his eloquence, combined with devoted labours to reclaim the degraded population of one of the worst dishlets of the city, soon won for him a high place in public estimation. In 1840 he was chosen minister of St John's church; he declined calls to London and India. In 1843 Guthuic joined the Free Church, and for a long series of years continned to minister to Free St John's-a large and influential congregation in Edinburgh. In 1845-46 he performed a great service to the Frec Church, in his advocacy throughout the country of its scheme for providing manses or residences for its ministers, and raised in less than twelve months [116 000, for this chieck. (Authorizing real bourges) £116,000 for this object. Guthrie's zeal, however, was not diverted into mere denominational or sectarian channels. He came forward in 1847 as the advocate of Ragged Schools (q.v.) by the publication of his first Plea for Ragged Schools. He was not, as sometimes stated, the founder of Ragged Schools, but rather the apostle of the movement. A Ragged School was founded on the Castle Hill, in 1887 removed to Liberton. He also carnestly exerted himself, in many ways, in opposition to intemperance and other prevailing vices, and in favour of national and compulsory education. He hecame a total abstainer in 1847 through a conversation with an Irish car-driver. Guthrie possessed great thetorical talcut; and his style was remarkable for the abundance and variety of the illustrations he used. Lord Cockburn attributed Guthrie's remarkable influence over his andience to the possession of 'passion and compassion.' Few public speakers have ever blended solemnity and deep pathos so intimately with the humorous, his tendency to which, although never in the pulpit, has more frequently than anything else been pointed out as his fault. Guthrie always displayed a generous sympathy with all that tends to progress or improvement of any kind. He was moderator of the General Assembly of the Free Church of Scotland in May 1862, and one of the vice-presidents of the Evangelical Alliance. He was presented with £5000 in 1865 as a token of public appreciation. He acted as editor of the Sunday Magazine from its establishment in 1864, in which year he retired from his regular ministrations. He died 24th February 1873. Guthrie's most important published works are The Gospel in Ezekiel (1855); The Way to Life (1862); A Plea for Drunkards and against Drunkenness (1850); A Plea for Ragged Schools, a pamphlet (1847), followed by a second and a third plea, the latter under the titlo of Scal-time and Harvest of Ragged Schools (1862); The City: its Sins and Sorrows (1857); Man and the Gospel (1865); Angels' Song (1865); Parables (1866); Studies of Character (1868); Sundays Abroad (1871). See his Autobiography and Memoir, edited by his sons (2 vols. 1874-75).

Guthrie, WILLIAM, a political, historical, and miscellaneous writer, was born at Brechin, in Forfarshire, in 1708, and educated at King's College, Aberdeen. At an early period he removed to London, where he worked hard for forty years as a man of letters. He died in March 1770. Among his various works are a History of England (3 vols. 1744-50), and A Historical and Geographical Grammar (1st ed. 1770; 24th ed. 1827), a useful manual of information, which enjoyed immenso popularity in its time.

Guts Muths, Johann Christoph Friedrich, a German teacher, was born at Quedlinburg, in Prussian Saxony, 9th August 1759, studied at Halle, and from 1785 to 1837 taught gymnastics and geography in Salzmann's scholastic institution at Schnepfenthal. He died 21st May 1839. He is specially remembered for having introduced gymnastics as a branch of education in German schools. On this subject and on geography he wrote numerous text-books, as Gymnastic für die Jugend (1793) and Handbuch der Geographie (1810); he also edited Bibliothek für Pädagogik (1800-20) and, along with Jacobi, Deutsches Land und deutsches Volk (1820-32). See his life by Wassmannsdorf (Heidelb. 1884).

Gutta-percha, a substance in many respects similar to caontehoue, is the dried milky juice of various trees of the order Sapotaecae; the chief is apparently that called by Hooker Isonandra Gutta, and by Bentley and Trimen Dichopsis Gutta. The tree, which is found in the peninsula of Malacca and the Malayan Archipelago, is vory large, attaining a height of 70 feet; the trunk is sometimes 3 or even 4 feet in diameter, although it is of little use as a timber-tree, the wood hoing spongy. The leaves are alternate, on long stalks, obovate-oblong, entire, somewhat leathery, green above, and

of a golden colour beneath. The flowers are in little trifts in the axils of the leaves, small, each on a distinct stalk, the corolla baving a short tube and six elliptical segments; they have twelve stamens and one pistil. The name, gutta-percha (yatta parcha, or gittah portja), is Malay. There are two or three kinds of gutta-percha known in commerce, and it is more than probable these are



Gutta-percha (Isonandra (Dichopsis) Gutta):
a, a flower; b, fruit

yielded by different species. That from Singapore is esteemed the best, and is distinguished by the Malay traders as Gutta Taban or Tuban; that of Borneo is of less value—this is called Gutta Percha by the traders, and has given the general name to all; and another kind goes by the name of Gutta Girck. The first two are those generally known in our markets. The former mode of obtaining the gutta-percha was a most destructive one. The finest trees were selected and ent down, and the bark stripped off; between the wood and bark a milky juico was found, which was scraped up into little troughs made of plantain leaves. Now the plan of tapping the living trees is employed. The juice soon coagulates, or may be boiled, and is then kneaded by hand into oblong masses a foot in length.

Gutta-percha was known in Europe long before its peculiar characteristics and uses were known. It was brought home at various times by voyagers, in the forms of drinking-bowls and native shoos; and was thought by some to be a species of india-rubber, while others asserted it was a kind of wood, which they named maxer-wood. But for its introduction in 1843 we are indebted chiefly to Dr William Montgomeric of the Indian Medical Service, who was rewarded with the gold medal of the Society of Arts. He first noticed that the Malays used it for making handles to their knives, &c., and it immediately occurred to him that it might be of great use in a variety of ways, especially in making handles for surgical instruments, the hand being able to get a light but firm grasp of them. Soon the importation of guttapercha increased amazingly; in 1860 it exceeded 16,000 cwt. In 1864, 1865, 1870, and 1871 the imports varied from 25,966 cwt. to 66,000 cwt. Down to 1888 these imports declined very much, at an average price of 162 shillings per cwt. In 1889, however, they showed an upward tendency both in quantity and value, the total imports from January to October 1889 being 38,940 cwt., and the average price 241 shillings per cwt. By far the

greatest portion of it is imported from the East Indies.

Its most important application has been in the coating of marine electric telegraph wires. In this application, as in most others, its inherent defect, arising from the readiness with which it becomes oxidised and decomposed, has manifested itself seriously, and it is greatly affected by age in its resisting qualities. Hence substitutes of greater stability have been looked for. Many of these stability have been looked for. Many of these have been forthcoming, india-rubber being used now to a large extent, as also a composition produced from asphalt, balsam of sulphur, &c., and other compounds. Gutta-percha is used for making a vast variety of useful and ornamental articles. Among others the following may be mentioned: golf-balls (very extensively), overshoes (more in America than in Britain), beltings for machinery, pump-buckets, sheeting, tissue, thread or whip eord, and tubing. A very large trade is done in shoe soles. It is turned by surgeons to various uses, chiefly for splints and moist coverings to retard evaporation. It has also been used for stopping hollow teeth. stopping hollow teeth.

The great value of gutta-pereba arises from the ease with which it can be worked, and its being so complete a non-conductor of electricity. It softens in warm water, and can be moulded into any form in that state, as when soft it is not sticky and turns well out of moulds. It will always be of great value as a material in which to take casts, as it can in the soft state be made to take the sharpest forms most faithfully; and, as it quickly becomes hard, and preserves its shape if not too thin, the range of its utility in this respect

is very extensive.
It is imported in blocks and lumps of five to ten pounds weight, in various forms, chiefly like large cakes, or rounded into gourd-like lumps. It has a very light reddish-brown, or almost a flesh colour, is full of irregular pores elongated in the direction in which the mass has been kneaded. It has a cork-like appearance when cut, and a peculiar cheese-like odon: Before it can be used it has to undergo some preparation. This consists in slicing the lumps into thin shavings, which are placed in a devilling or tearing machine revolving in a trough of hot water. This reduces the shavings to exceedingly small pieces, which, by the movement of the tearing-teeth, are washed free from many impurities, especially fragments of the bark of the tree, which, if not separated, would interfere with the compactness of its texture—one of its most important qualities. The small fragments, when sufficiently cleansed, are kneaded into masses; and these are rolled several times between heated cylinders, which press out any air or water, and render the mass uniform in texture. It is then rolled between heated steel rollers into sheets of various thick-nesses for use, or is formed into rods, pipes for water, speaking-tubes, or any of the innumerable articles which may be made of it.

Gutta-percha differs very materially from caoutchouse or india-rubber in being non-elastic, or elastic only in a very small degree. Notwithstanding this very striking character of caoutchouc, the two articles are very often confounded in the public

Gutta Rosea, old name for Aene Rosacca (q.v.). Gutter. See Building.

Guttifera, or CLUSIACEM, a natural order of exogenous plants, consisting of trees and shrubs, natives of tropical countries, very generally secreting an aerid yellow resinous juice. A few are epiphytes. The leaves are opposite, destitute of stipules, leathery, and entire. In botanical characters this order is allied to Hypericinæ. It

contains about 150 known species, the greater part of them South American, although all tropical countries produce some. The resinous secretions of countries produce some. The resinous secretions of some are valuable, particularly of those trees which yield Gamboge (4.v.) and Tacamahaca (4.v.). See also CLUSIA.—A few species afford valuable timber. See CALOPHYLLUM.—The flowers of some are very fragrant; those of Mesna ferrea are found in a dried state in every bazaar in India, and are used as a perfume.—The fruit of some is very highly described the Message for the latest and the la esteemed; the Mangosten (q.v.) has been described as the finest fruit in the world. The Mannuee Apple (q.v.) is another of the most celebrated tropical fruits.

Gutzkow, KARL FERDINAND, German writer, born at Berlin, 17th March 1811. Whilst pre-paring for the calling of gymnasium teacher he became profoundly influenced by the French Revo-lution of 1820, and in 1821 by third of hetion of 1830, and in 1831 he joined the critic Menzel in Stattgart, and helped him to edit the Litteraturblatt. This his introduction to serious literary work led to the publication in 1832 of the satirical romance Maha-Guru, and in 1835 of Wally, die Zweiflerin. For this last Gutzkow was imprisoned for three months, his book being confiscated and himself forbidden to publish any work within and himself forbidden to publish any work within the states of the Confederation—the author having revealed himself in his book as an ardent champion of the 'Young Germany' movement, the object of which was to oppose romanticism and advocate in place of it all those revolutionary ideas which are in place of it all those revolutionary ideas which are in their character essentially and peculiarly modern. As soon as he obtained his release he entered upon a period of restless and migratory activity as a journalist, until in 1847 he became director of the Court Theatre at Dresden. In the meantime he had written some successful dramas, Richard Savage (1839), Zopf and Schwert (1844), Das Urbild des Tartuffe (1847), Uriel Acosta (1847), besides Werner, Ottfried, Der Königsleutnant, and many others which won only dubious recognition. He also wrote some romances of consider mition. He also wrote some romances of considernition. He also wrote some romances of considerable merit, as Dic Ritter vom Geist (9 vols. 1850-52), Der Zauberer von Rom (9 vols. 1858-61), Hohenschwangau (5 vols. 1867-68), and Kleine Narrenwelt (1856), a collection of short stories. In 1864 Gutzkow, whilst suffering from a nervous mental disorder, made an unsuccessful attempt upon his own life. This malady returned in 1873, and after a visit to Italy he settled at Sachsenhausen, near Frankfort-on-Main, where he died 16th December 1878. Gutzkow possessed a died, 16th December 1878, Gutzkow possessed a keen instinct for the spiritual fermentations and conflicts and the intellectual problems of his time, and in his literary productions could not sufficiently subordinate his interests to the proper canons of art. These didactic and critical phases of his temperament spoil most of his best books, except perhaps Uricl Acosta. Apart from this failing, and the great length of some of them, those same books exhibit much excellent character drawing, much keen analysis of motives, a penetrating insight into the tendencies of current thought, clever dialogues, and skilful and dramatic arrangement of situations and scenes. His Gesammelte Werke have been issued in 32 vols. (Jena, 1873 sg.).

Gitzlaff, Karl Friedrich August, German missionary to China, was born at Pyritz, in Pomerania, 8th July 1803. Going out to the East under the auspices of the Dutch Missionary Society, he spent two years in Batavia learning Chinese. Then, in 1828, he proceeded to Bangkok, capital of Siam, where he translated the Bible into Siamcse. Finally, in 1831, he reached the goal of his aspira-tions—China. During the rest of his life he lived mostly at Macao and Hong-kong, occupying himself with a translation of the Bible into Chinese, with writing various books in Chinese, German, and English, with publishing a monthly magazine in Chinese, and above all (from 1844) with the training of native preachers to earry the gospel into the interior, for at that time foreigners were not allowed to enter the empire. He rendered valuable assistance to the British during the war of 1840-42 and the subsequent negotiations for peace. He died at Hong-kong, 9th August 1851. He published a Journal of Three Voyages along the Coust of China (1838); The Life of Tao-Chang (1838); and a history of China in German (1847), besides addresses, reports, &c.

Guy, Thomas, founder of Guy's Hospital (q.v.), Southwark, London, the son of a lighterman and coal-dealer, was born in Fair Street, Horselydown, near the Thames, in 1644. He began business in 1668 in the angle formed by Cornhill and Lombard Street, as a bookseller with a stock of about £200, dealing extensively in the importation of English Bibles from Holland (those printed at home being executed very badly); and, on this being stopped, he contracted with the university of Oxford for the privilege of printing Bibles, which he continued to do for many years. By this means, and hy selling ont his original shares in South Sea Stock at a great advantage, he amassed a fortune of nearly half a million sterling. In 1707 he bnilt and furnished three wards of St Thomas's Hospital. For the building and endowment of the hospital in Southwark which bears his name he set apart £238,295, 16s. He was also a liberal benefactor to the Stationors' Company, and built and endowed almshouses and a library at Tamwurth, for which he became one of the members about 1694. Busides bestowing £400 a year on Christ's Hospital, and giving to various other charities, he left £80,000 to be divided among those who could prove any degree of relationship to him. He was of mean appearance, with a melancholy expression of cenntenance, and during his whole lifetime had no other reputation than that of an intensely selfish and avaricious man. He died December 27, 1724, aged eighty.

Guy of Warwick, the hero of one of the most ancient and popular of our early English metrical romances. It is a nurely English story of the 13th century, related to the Dano-Saxon romance of Havelok by its allusions to Danish wars in England, and to the French King Horu by its adoption of some of the more striking incidents in that story. Its authorship may be due to Walter of Exeter, a 13th-century Franciscan monk, but it has undoubtedly been improved by some French or Norman minstrel. The story has close affinity with that of Guido Tyrius in the Gesta Romanorum. The hera, Sir Guy of Warwick, is son of Segard, steward of Rohand, Earl of Warwick; his instructor in the exercises of chivalry, the famous Hérand of Ardenne. Having fallen deeply in love with Felice, the fair and accomplished daughter of the earl, he fell into a grievous sickness, but was recalled to life by a promise of her hand when he had carned it by knightly deeds. Immediately he crossed to Normandy, at the great tournament of Ronen vanquished every competitor, and at once set out into far lands, travelling through Spain, Almayne, and Lombardy, and gaining the prize in every tournament. He then returned to England, and overcame the famous Dnn Cow on Dunsmore Heath, near Warwick. But his haughty mistress was still misatisfied. Once more he left his country to traverse Flanders and Italy, and here he well-nigh lost his life through the troachery of Otho, the 'felon duke' of Pavia. Ho next went to Constantinople to save the Emperor

Ernis from the Saracens, slew the mighty Coldran, consin of the soudan, and scattered his lugge army. The grateful emperor pressed on him the hand of his lovely daughter and heiress Loret, but, faithful to Felice, Sir Gny tore himself away, and returned, with many adventures by the way, to his native country. No sooner had he reached its shores than tidings were brought of a most portentous dragon then ravaging Northumherland. He hastened to meet the monster, slew him, and earlied his head to King Athelsan, at Lincoln. The fair Felice had now no scruple to marry the hero. But remoise for all the slaughter he had done merely for a woman's love began to seize him, and after forty brief days of wedded happiness he left his home in the dress of a palmer to visit the Holy Land. Here he rescued Earl Jonas from his dangeon, and slew the feracious giant Amiranut, after which he returned to England to find Athelstan besieged in Winchester by the Danish Anlaf, of whose army the mainstay was the tentible Colbrand. Sir Gny, still in his disguise, after a prolonged and awful struggle, succeeded in stilking off the champion's head. He naw visited his wife all unknown in his palmer's weeds, and then retired to a hermitage at the place still called Gny's Cliff, near Watwick. Before his death he sent her parting ring as a token to Felice, and she arrived in time to close his eyes, survived him for lut lifteen days, and was buried in the same grave.

An edition in French prose was printed at Paris in 1525; the earliest English edition is undated, but most probably appeared about 1550. The earliest English MS., that of Auchinleck, was printed for the Abbetsford Unib in 1840; and again, together with the Cains MS., by Professor Zupitza for the Early English Text Society (1883-87). A 15th-century version had already been edited for the same society by Zupitza (1875-76). All these MSS. have most probably been translated from the Anglo-French version. See J. Zupitza, Zur Literaturgeschichte des Guy von Warwick (Vienna, 1873); A. Tamier, Die Sage von Guy von Warwick (1877).

Guyon, Jeanne Marie Bouvières de la Mottie, French mystic, was born at Montargis (dept. Loiret), 13th April 1648. She had destined horself for the cloister, but was married, when sixteen years of age, to Jacques Guyon, a man of great wealth, but much older than herself. Being, however, left a widow at twenty-eight, she determined to devote her life to practical ministrations to the poor and needy, and to the cultivation of spiritual perfection, or an endeavour to realise the consumunate achievements of the inner life, for herself. The former part of her plan she began to carry out in 1681 in the neighbourhood of Geneva, where she found a sympathetic coadjutor in Father La Combe. But three years later she was compelled to depart thence on the ground that her Quietist doctrines were heretical (see Quietists). At Turin, Grenohle, Nice, Genoa, Vercelli, and Paris, where she finally settled in 1686, she became the centre of a religious movement for the encouragement of 'holy living.' But in January 1688 she was arrested for having taught heretical opinions, and for having been in correspondence with Molinos, the leader of quietism in Spain. Released by the intervention of Madame de Maintenon, after a detention of nine months, she soon afterwards became acquainted with Fénclou; but, her influence spreading, she was again imprisoned in 1695. Out of a commission appointed to inquire into her teachings and conduct of life arose a controversy between Fénelou (q.v.) and Bassuel. Madame Guyon was not released from the Bastille until 1702. The remainder of her life was spent in retirement at Blois, where she died, 9th June 1717. Her views find best expression in her works entitled

Les Torrens Spirituels, Moyen Court de Faire Oraison, and Le Cantique des Cartiques interpreté selon le sens mystique. She also wrote an anto-hiography and letters, as well as some spiritual poetry. Her collected works appeared in 40 vols. in 1767-91. See Upham, Life and Religious Opinions of Madame Guyon (New York, 1847), and Guerrier, Madame Guyon (Orleans, 1881).

Guyon, RICHARD DEBAUFRE, a general in the Hungarian revolutionary war, was born at Walcot, near Bath, 31st March 1813. His father, a commander in the English navy, was the descendant of a Hugnenot family that settled in England after the revocation of the Edict of Nantes. Guyon entered the Austrian service in 1831; and married the daughter of a Hungarian baron and field-marshal in 1838. From that time till the outbreak of the revolution, Guyon led the life of a country gentleman on his estates near Komorn, but was one among the first to offer his services to the national government, and acted a prominent part in the struggle for independence. During the retreat of Gorgei's army, Guyon carried the mountain-pass of Branyiszko, and by that daring feat re-established the communication with the government at Debreezin, as also with the several other Hungarian army corps. He did brilliant service at Kapolya, Komorn, and elsewhere; and after the end of the war escaped to Turkey, and entered the service of the sultan, without being obliged to turn Mohammedan. Under the name of Kourshid Pasha, he, as a general of division, was governor of Damascus, and at the leginning of the Crimean war did much to organise the army of Kars. He died at Constantinople, 12th October 1856. See A. Kinglake, General Guyon (1856).

Guyot, Arnold, geographer, was born in Switzerland in 1807, took the degree of Ph.D. at Berlin in 1835, was the colleague of Agassiz at Nenchâtel in 1839-48, and in 1848 accompanied him to America. Guyot delivered a course of lectures at the Lowell Institute, which were translated by Professor Felton (q.v.), and published as Earth and Man (1853). In 1854 he was appointed professor of Physical Geography and Geology at Princeton, where he died, 8th February 1884. He had the management of the meteorological department of the Smithsonian Institution, where he more than once delivered courses of lectures, and in connection with which he published Meteorological and Physical Tables (revised ed. 1884). Guyot was joint-editor of Johnson's Cyclopadia (1874-77), and his other works include several biographies, a Treatise on Physical Geography (1873), and a series of geographics and wall-maps which are in general use in American schools.

Guy's Mospital was founded by Thomas Gny (q.v.), who leased from the governors of St Thomas's Hospital a large piece of ground, for a term of 999 years, at a ground-rent of £30 a year. The space heing cleared, the first stone of the building was laid in 1722, and the haspital admitted its first patient in 1725, a few days after the death of its founder. The whole expense was £18,796, 16s., great part of which Gny expended in his lifetime, and he bequeathed £219,499 to endow it. Soon after his death an act of parliament was obtained, regulating the management of the institution. In 1829 Mr Hunt bequeathed to the hospital £190,000, and additional bequests to the amount of £10,000 have since been received. There was at first room for about 400 patients; now 700 can be accommodated. The yearly average of patients is over 5000; the ont-patients relieved may amount to above \$0,000. The annual income is about £40,000, chiefly from estates in the counties of Essex, Hereford, and Lincoln. The

usual number of governors is sixty, who are self-elective. Students enter the hospital for study, attending clinical practice, 'lectures, &c., and paying annual fees. The building consists of two quadrangles, united by a cross structure or arcade, besides two wings extending from the front to the street—west wing built with elegance and uniformity, and whole edifice handsome and regular. A library and valuable unusenms are attached to the hospital. New wards, with tall towers for ventilation, were built in 1852, and a chemical laboratory in 1872. In the chapel is a fine marble statue of Guy, by Bacon, which cost £1000. Sir Astley Cooper, the eminent singcon, is buried in the chapel.

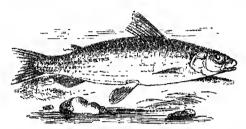
Guzerat. See GUJARAT.

Guzman Blanco, Antonio, was born in Caricas in 1830, was banished for his share in political distarbances, and, after taking a praminent part in two invasions, became vice-president of Venezuela in 1863. Driven from office in 1868, he headed a revolution which restored him to power in 1870, and for many years he was virtual dictator of the country; other men were occasionally permitted to fill the position of president, but they were merely figure-heads. In 1889, however, popular discontent was aggravated by reports of cormpt contracts made in Paris; and Blanco, who was then acting as envoy to all the European powers, was practically deposed by congress, which refused to accept the resignation of his former prategé and present rival, Dr Rajas Paul. For Guzman Blanco state, see Cura (Ciudad de).

Gwaltor, a native state of central India, the dominions of the Mahratta Maharajah Sindhia (q.v.), consists of several detached districts, with an area of 29,046 sq. m., lying principally between 23° 20′ and 26° 52′ N. lat., and in 76° 15′ to 79° 12′ E. long. Lying partly in the basin of the Jumna and partly in that of the Nerbudda, it divides its drainage between the Bay of Bengal and the Arabian Sea. The principal export is opium. At the ceusus of 1881, the first attempted, the population was 3,115,857, of whom 2,768,385 were Hindus. Though Gwaltor is a Mahratta principality, being, in fact, the principal fragment of the great empire of the Peshwa, yet the Mahrattas do not form any considerable proportion of the people, and are said to number only 15,000. The revenue of the state is estimated at £1,200,000; the strength of the army is fixed at 6000 cavalry, 5000 infantry, and 48 gnns, and there are nearly 7500 police. Since 1803 the country has been under British protection. In 1843 the British were compelled, on the death of the sovereign, to send an armed force, which, after severe fighting, succeeded in restoring his adopted successor to the throne; and during the troubles of 1857 the young Maharajah remained faithful to the British government, although deserted by his troaps.—Gwaltor, the capital, stands 65 miles S. of Agra by railway. Its nucleus is an isolated rock of about 340 feet in height, perpendicular, either naturally or artificially, on all sides; it measures 1½ mile by 300 yards, and its citadel (said to date from the 8th century), whose guns sweep the only approach, is virtually impregnable against any native force. Along the eastern base of this eminence lies the old town of Gwalior, containing little worthy of notice but a beantiful mausoleum of white sand-stone; and to the south-wext there extends for several miles the new town called Lashkar, where the Maharajah resides. Nearly 4 miles to the north-east is Morar, the British cantonment from 1858 to 1835, when its fine sandstone barracks wer

Gwalior possesses two remarkable Hindu temples, and one of the most interesting examples of Hindu palace-architecture in India; while Jain caves and rock-soulptures abound on all sides. Pop. (1881) of Lashkar, 88,066; of Morar, 24,022.

Gwyniad (Coregonus chapeoides), a small freshwater fish in the family Salmonide. From its form, the nature of the scales, and the silvery appearance it is sometimes called the Freshwater Herring. The gwyniad, when full grown, is about 10 or 12 inches in length; the first dorsal fin is high; the snout is a little produced; the mouth is small, and the jaws are without teeth. It is found



Gwyniad (Coregonns clupcoides).

in some of the lakes of Wales and Comberland. Gwyniad is a Welsh name, while at Ullswater the fish is called Schelly. It occurs in that lake in great shoals, so that many hundreds are sometimes taken at a single draught of the net. It is rather an insipid fish, and cannot be kept long after being taken out of the water, unless salted, which it often is by the poor. There are numerous nearly-related species, such as the Irish 'pollan', (C. pollan'), the 'vendace' (C. vandesius) of Lochmaben, and the 'white fish' of North American lakes. See Coregonus.

GWYNH, NELL. See CHARLES II.

Gyarmat-Balassa, or Balassa-Gyarmay, a town of Hungary, 40 miles N. by E. of Pesth. Here peace was concluded between Austria and Turkey in 1626. Pop. 6788.

Gyges, king of Lydia, who obtained the throne by murdering his master, King Candanles, and marrying his widow. This happened about 687 B.C. Gyges reigned thirty-four years, during the course of which he wrested Magnesia and Colophon from the Ionian Greeks, lent assistance to Psammetichus in his revolt in Egypt against Assyria, and, after stoutly defending himself for some time against the Cimmerians, was at last slain by them (654 B.C.). Plato has a fable in which Gyges, luving miraculously obtained possession of a golden ring of great virtue, was enabled by means of it to make himself invisible, and thus took occasiou to murder his sovereign and usurp the supreme power.

Gymnasium. This word (from gymnus, 'naked') was applied to those public places or buildings where the Greek youths exercised themselves, fitted up with running and wrestling grounds, baths, and rooms or halls for conversation and discussion. These were the favourite resort of youth, and for this reason were frequented by teachers, especially philosophers. The three great gymnasia of Athens were the Academy, where Plato taught; the Lyceum, where Aristotle laboured; and the Cynosorges. In this connection it is easy to understand the transference of the name to institutions for the mental disciplining and instruction of youth. The German gymnasium is an upper school where instruction is carried out largely by means of the classical tongues, preparing its pupils for the university, and corresponding roughly to the grammar and public schools of England, and the grammar

and high schools of Scotland. See EDUCATION, Vol. IV. p. 208.

Gymnastics. According to the derivation and original use of the word Gymnastics (gymnos, naked or stripped') all athletic exercises might be included under this head, but the term is now much more restricted in its application. It excludes athletic sports, and all outdoor games such as cricket, faotball, and lawn-tennis, and is limited to certain exercises devised to strengthen the muscles and bones, especially those of the upper half of the body.

Gymnastic games in their original sense are so old as to be prehistoric; they are alluded to in the 2d and 23d books of the *Iliad*. Before the time of Hippocrates gymnastic exercises had been adopted in Greece as part of the course of medicine intended to counteract increasing luxury and indolence. The various exercises were speedily combined into a system, and gymnasia, where they should be practised, were formed first by the Lacedemonians, and subsequently at Athens. The Romans adopted the system, and constructed and a magnificent scale. Many of their buildings, having extensive baths attached, were known as thermae. The exercises in the gymnasia consisted of unning, leaping, dancing, wrestling, boxing, hurling, &c.; and in those days, when all men hore arms, and when, in close combat, victory went generally to the strongest man, these games were doubtless of great value. In subsequent ages of knightly prowess similar exercises were probably practised, though less publicly; but with the introduction of gunpowder, and through its means, the gradual substitution of fighting at a distance—in which science and skill were the main requisitesfor personal encounters where strength and muscle went far to carry the day, the attention paid to gymnasties decreased, and linally vanished altogether. To make infantry soldiers perfect in the drilled movements of masses, envalry soldiers good horsemen and fair swordsmen, and to have gumers who could take an accurate aim became the numest sought by the possessors of great armies; while the science of gymnastics, having gone out of repute for the military, was speedily neglected in merely civil life. It is only since the earlier portion of the 19th century that the science has at all revived.

The revival commenced in Germany, where, in 1774 and 1784, gymnasia were opened by Basedow (q.v.) and Salzmann at Dessan and Schnepfenthal in Thüringen, that of the latter being under the superintendence of the celebrated gymnastic pedagogue Guts Maths (q.v.). In 1811 Friedrich Ludwig Jahn (1778–1852), the so-called 'Turnvater,' or father of gymnastics, opened the first 'turnplatz' at Berlin, and he rendered the science of gymnastics so popular that it speedily attracted the attention of the youth throughout the kingdom, and to the training thus obtained must be attributed, in no small degree, the vigour which succeeded in driving out the French army of the first empire. Sweden soon imitated Prussia, and from that time gymnastics has formed a prominent feature in the Scandinavian course of education. In Prussia the gymnasia began to be the scenes of political gatherings, too liberal in tendency to please its semi-military government; and in 1818 they were all closed. The troops were, however, continued in gymnastic exercises, and showed so clearly the advantages of the training they experienced that, about 1844, Louis-Philippe adopted and improved the system in the French army. From that time gymnasia have been constructed for almost all continental armies, and, with more or less success, for the civil population. England moved publicly in the matter in 1860, in which year Major (afterwards Major-general) Hammersley, the 'father of

military gymnastics,' was sent to Oxford to be trained in Mr MacLaren's gymnasium, and the gymnasia at Aldershot and other stations were then built and placed under his superintendence. In private life, however, there had long been many excellent gymnasia, one of the best and earliest being that opened at Oxford by the late Archibald MacLaren in 1858.

Gymnastic exercises may be divided into two great groups, those conducted without and those conducted with apparatus, while the latter group may be again subdivided into those requiring movable apparatus and those requiring immovable apparatus—i.e. so far as the gymnast is concerned.

Exercises without apparative have been specially studied in Sweden, and there chiefly by Professor Ling (1776–1839), whose name is generally associated with them in England. By various movements of the arms, trunk, and lower limbs, singly or combined, every muscle in the body can be brought into play, and all that is required for keeping the body in health can thus easily be pactised. In schools these movements have often been carried ant with great advantage between lessons, giving the children that exercise which their growing frames demand, and thus avoiding restlessness, which is the natural result of enforced quiet. When a number of children work together, and especially when in time to music, the interest of the practice is greatly increased. For further information the reader may consult Dr Roth's account of the Ling system (1864), or Ling's Succlish Cymnastics (Lond. 1885). So important are these exercises without apparatus considered in the army that a series of them, known as 'Extension Exercises,' lave been laid down in the ordinary Field Exercise Drillbook, and in the 1888 edition of this work they have been carefully reconsidered and improved.

Next in simplicity are gymnastic exercises with movable apparatus—i.e. such as weights and bars. Of these, the commonest forms are dumh-bells, harbells—i.e. bars about 3 feet long with a weight at either end—and Indian chibs. The arms and shoulders can be made to do any amount of work with these, according to the weights employed, and, if so desired, many of the exercises of the first group designed for the trunk and lawer limbs may be carried out while dnmb-hells or bar-bells are held in the hands, thus materially increasing the work done. The weight of any or all of these should be carefully suited to the strength of the individual, otherwise more harm than good may result from their use.

The forms of apparatns required for the last group of exercises are numerous, but only a few are really essential. Thus we have the horizontal har, capable of heing placed at any desired level between 3 and 10 feet; and parallel bars—i.e. two bars about 30 inches apart, and fixed about 4 feet from the ground. With these abmost as much exercise as may be wanted can be obtained. But in most gymnasia there are, besides, iron rings hing by ropes from the roof, a trapeze-bar also hing from the root, ladders limizontal at some distance above the floor and vertical, climbing poles and ropes, and various pulleys with weights attached for exercising the wrists and shoulders.

It is advisable that beginners working in a gymnasium should be under the direction of an instructor, who will be able to graduate their exercises, so as to avoid any overstraining. Light and loose flamed clothing should in all cases be worn.

The special value of gynnastics lies in their exercising the arms, shoulders, and chest. On this account they are particularly valuable for all who lead scdentary lives, and also as an important auxiliary for those who wish by athletic exercises to perfect their unscular development.

The system of gymnastics adopted in the British army is a thorough one, and is well calculated to develop the frames of recruits, as well as to harden and strengthen those of the drilled men. The course begins with the use of movable apparatus, after which the trunk and lower limbs are exercised by walking, leaping, and vaulting; next the muscles of the arms and of the trunk are brought out by exercises on the trapeze and parallel bars. Then the muscles of the whole body are developed by various climbing exercises on poles, ropes, and ladders; and, lastly, the training is brought to a practical bearing by escalading practice. In order to improve respiration running drill has also been instituted.

The theory of the advantage derivable from gymnastics is simple enough. An admirable law of nature provides that—within certain limits—parts of the luman frame increase in strength, aptitude, and size in proportion to the use made of them. In gymnastics this law is brought to bear successively on every part, and finally on the whole system in combined action. If the exertion be not carried so far as to induce excessive fatigue, all other parts of the body sympathise with the improving condition of that which is mainly exerted; the circulation, excited from time to time by the exercise, acquires fresh vigour, and, blood being driven with unwonted face into all parts of the system, every function is carried on with increased activity. An improvement in the general health soon becomes manifest, and the mind—if simultaneously enlivented with judgment—increases in power and endurance.

See Captain Chiasso's (immastics and Calisthenus; G. Roland's (immastics; Walker's British Manly Exercises; and MacLaren's Training, in Theory and Practice, and Physical Education, Theoretical and Practice, and Physical Education, Theoretical and Practical (1868). The books written in German on Gymnastics ('Turnkunst') would form a small library.

Gymne'ma. See Cow-PLANT.

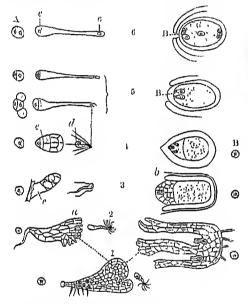
Gymno'cladus, a genus of trees of the natural order Leguminoste, sub-order Cresalpinieu.—G. Canadensis is a North American tree, found both in Canada and over a great part of the United States, attaining a height of 50 to 60 feet, with branches remarkable for their upright direction, and an exceedingly rough back which comes off in slips. The leaves of young trees are very large, three feet long, bipinnate, armed with thorns. The flowers are white in short spikes. The pods are tive inches long by two broad. The tree is called Chicot in Canada, and sometimes Stamp Tree, from its dead appearance in winter, and the absence of conspicuous buds. It is also called the Kentucky Cuffee Tree, because the seeds were formerly roasted and ground as coffee in Kentucky. It grows well in Britain. The wood is used both by cabinet-makers and by carpenters. It has very little sapwood. The pods, preserved like those of the tamarind, are said to be wholesome and slightly aperient.

Gymnogens, Lindley's term, now obsolete, for the Gymnosperms (q, v_*) .

Gymnosomata. See Pteropod.

Gynnosophists (i.e. 'naked sages'), the name given by the Greeks to those ancient Hindu philosophers who lived solitarily, wore little or no clothing, and addicted themselves to mystical contemplation and the practice of the most rigorous asceticism. Some, like Kalanus, even burned themselves to death in order to enter a state of nurer being. Strabo divides them into Brahmans and Samans, the former of whom adhered to the strictest principles of caste, while the latter admitted any one into their number regarding whose character and kindred they were satisfied.

Gymnosperms (Gr. gymnos, 'naked;' hence the name Gymnosperms, 'naked-secded' plants), the lower or more primitive group of seed-plants (Phanerogams, q.v.), differ in many points from the higher group, the Angiasperms. The chief differences are summarised in the article Angiosperms (q.v.). Gymnosperms consist of the orders Cycadaceae (q.v.), Coniferae (q.v.), and Guetaceae (see SEA-GRAPE). Although these orders do not resemble one another externally, their morphological characters and mode of sexual reproduction are very similar. In structure their stems resemble those of Dicotyledons (q.v.); the secondary wood is formed in concentric rings from permanent cambinun, contains tracheides with hordered pits, but no true vessels; and secretory passages are present in most stems, containing resin in conifers and gum in cycads. It is, however, from their mode of sexual reproduction that we are able most clearly to assign their place among plants, as a connecting link between the higher cryptogams and angiosperms.



The hermaphrodite Fern Prothallus contrasted with male

 (a) and female
 (b) Prothalli of Equisatum;
 2, above are corresponding reductions of the sexual prothalli in 3, Salvania,
 4, Isoetes, 5. Oycad and Conifer, and 6, many Angiosperus.
 A, microspores or pollen-grains;
 e, male pronucleus;
 d, spermatozoid;
 e, nucle protiallus.
 B, macrospores.

In gymnosperms we first meet with an organ which is morphologically, and at the same time physiologically, a Flower (q.v.). The flowers are nnisexual; and the plants either monocious or diocious; while hermaphroditism prevails among Angiosperms. The male flowers are stamens bearing pollen-sacs, which develop free unicellular pollen-grains; those three sets of structures heing respectively the homologues of sprophylls, microsporangia, and microspores of cryptogams. Each pollen-grain divides into a large reproductive cell and one or more vegetative cells (the male protabilism of higher cryptogams). Each cell has a nucleus, and that of the reproductive cell, the male promonologues, is the homologue of the spermatozoid of cryptogams. When the stamens are matured, the sacs open; the grains are shaken out, and some are borne by the wind to the surfaces of ripe ovules (macrosporangia of cryptogams). When a pollongrain reaches an ovule it begins to germinate, its coat ruptures, the reproductive cell grows at the

expense of the vegetative to form a pollen-tube (antheridium of cryptogams) which ultimately penetrates the nucellus of the ovule, and its promeleus fertilises the pronucleus of the osphere (see Fern). This is a step in advance of the higher cryptogams, for their microspores are shed from the parent plant, and germinate only in a substratum where they develop into prothalfi-bearing autheridia from which spermatozoids are eventually set free. The microspores of Salvinia nations, a heterosporous fern, form the only exception, because they develop prothalli and autheridia within the sporangium. Spermatozoids can fertilise only with the help of water; while pollen-grains of gymnosperms are earried by the wind to the female flowers.

In gymnosperms, then, we have a very marked transition in the process of fertilisation. Spermatozoids readily pass down the neck canals of archegonia and so reach the oosphere, but they would be unable to pierce the nucellus of gymno. sperms; hence the necessity of a slow-growing pollen-tube in the latter. The female flower is a macrosporangium borne at the end of an axis or shoot, or a carpellary leaf (sporophyll), with a macrosporanginn in its axil, on its upper surface, or on its margin. The ovule has never more than one coat; while in many angiosperms there are two. Further, the carpellary leaves never unite to form an ovary round the ovule, which, therefore, remains naked the name); in angiosperus the ovules are always onclosed in ovaries. The ovule is filled at first with a mass of tissue, the nucellus, in which is afterwards developed the embryo-sac or mother-cell (unacrospore of cryptogams); this sac forms within itself a prothallus (also called endospern of phanerogams) which develops at its anterior end several archegonia (see PERN, fig. 2). The endospern of gynnosperms is formed before, The endosperm of gymnosperms is formed before, that of angiosperms after fertilisation. Inside each archegonium is an oosphere which, after fertilisation of its pronucleus by the male pronucleus, develops the embryo. Part only of the oosphere forms the embryo, the rest forms a kind of mutitive yolk, thus resembling the eggs of many animals. This is the only example of meroblastic segmentation of the ownm in the regardle kingdom (see Example 1999). The one regetable kingdom (see EMBRYOLOGY). The embryo lies straight in the prothallus, and never curved as in many angiosperms. Concealment of alternation of generations thus takes place for the first time in gymnosperms. In vascular cryptogams there are two distinct sets of individuals—viz. the asexnal (sporophyte generation) represented by the fern-plant, and the sexnal (cophyte generation) represented by the minute fern-prothallus. The sexual individuals of cryptogams, with the exception of the microspores of Salvinia, lead independent lives for a time; but those of phanerogams are parasitic on the parent plant; and as parasitism lends to degeneration of parts, so we have the pro-thalli in gymnosperius reduced, and still more reduced in angiosperius. The evolution of plantforms has thus been a progressive increase of the sporophyte generation at the expense of the cophyte, and this is in harmony with the characteristically anabolic nature of illants, See Goebel's Morphology of Plants, Sach's Physiology of Plants, and Vines's Physiology of Plants.

Gymnotus, or Electric Eel (C. electricus), the most powerful of the electric fishes, occurs in the fresh water of Brazil and Guiana. It is type of a family Gymnotidic among the Physostomatous bony lishes, but is the only known species of its genus. There are no dorsal nor strictly candal fins, but the anal fin extends on to the end of the tail; there are no scales, and the eyes are very small. The fish attains a length of 6

feet, and is capable with its shock of temporarily paralysing a man or large animal, or of killing its



Electric Eel (Gymnotus electricus).

prey of fishes and amphibians. For description of the cleetric organs, see Electric Fishes.

Gympic (the native name for a stinging tree growing in the district), a town of Queensland, prettily situated on the upper waters of the river Mary, 61 miles by rail S. of Maryborough. There are ununerous gold-reefs round about, which in 1867–87 yielded a total of 1,323,480 oz. Pop. 7659.

Gynacology, that branch of Medicine which treats of the diseases and affections peculiar to woman and her physical organisation.

Gynocardia, the botanical name of the chanlungra tree, whose seeds yield an oil that is highly valued in India and China as a remedy in skin diseases and diseases caused by impurities of the blood. In Mauritius it is used in cases of dropsy, and its use is advocated as a cure for consumption in England.

Gyoma, a town of Hungary, on the Körös, 89 miles SE. of Pesth by rail. Pop. 10,160.

Gyöngyös, a town of Hungary, at the southern base of the Matra Monutains, 59 miles by rail NE of Pesth. It has mineral baths. Pop. 15,896.

Gypaëtos. See Lämmergeier.

Gypsics, a wandering race, dispersed the wide world over, and distinguished by language, physique, and mode of life. Their number in Europe is vaguely estimated at 700,000; and only for the following countries have we these more or less trustworthy statistics: Hungary (1889), 80,000; Besnia and Herzegovina (1874), 9537; Servia (1884), 30,066; Roumania (1889), 200,000; Bulgaria and Eastern Roumelia (1888), 50,291; the vilayet of Adrianople (1876), 27,326 unales: Russia (1877), 11,654; Prussia (1887), 1054 settled Gypsies. Asia has untold thousands of these nomads, in Anatolia, Syria, Armenia, Persia, Turkestan, and Siberia; so, too, has Africa, in Egypt, Algeria, Dar-Fûr, and Kordofan. We find them in both North and South America, from Picton in Canada to Rio in Brazil; nor are even New Zealand and Australia without their isolated bands.

Late in 1417 four hundred 'Secani' arrived from the East at Limeburg, and thence passed on to Hamburg, Lübeck, Wismar, Rostock, Stralsund, and Greifswald. In 1418 they are heard of at Leipzig and Frankfort-on-the-Main, in Switzerland, and at Augsburg; in 1419 at Mācon and at Sisteron in Provence; in 1420 at Deventer; in 1421 at Tournai; in 1422, en route for Rome, at Bologna and at Forli, where 'some said they were from India;' in 1427 at Paris; and so on till in 1433 we lose sight of them for a while in Bavaria. Oftenest they seem to have hivouacked in the fields, but at Deventer they slept in a barn, at Bologna 'lodged themselves inside and outside the gate of Galiera, and settled themselves under the porticoes, with the exception of Duke Andrew, who lay at the King's Inn.' Some riding and some afoot, with

the women and children in wagons, they were led by him or Duke Michael, or by both together, according as the band, 400 to 1400 strong, split up or reunited. These two chieftains and certain subordinate 'counts' went richly dressed, with fine silver belts, and, like nobles, led dogs of chase; but the rest of the 'Egyptians,' 'Saracens,' or 'baptised heathens' are described as lean, hideous, black as Tartais, poor, and pitiful. They lived on charity, and practised horse-channting, punsecuting, palmistry, shop-lifting, and ringing the changes, wherefore some were taken and slain. They hore letters of protection from the Emperor Sigismund (procured probably in 1417 at Lindau on Lake Constance), and, after 1422, from Pope Martin V.; and they professed sometimes to be engaged in a seven years' pilgrimage, imposed by their bishops as a penance for apostasy from the Christian faith, sometimes to have been driven out of 'Little Egypt' by the Saracens for refusing to apostatise. Yet another story was told by the tented 'Cingari or Cigiawnär,' who appeared at Ratishon in 1424-26, that their exile was meant 'for a sign or memorial of the flight ef our Lord into Egypt.' These, whose weiwode Ladislaus also hore letters (1423) from Sigismund, were natives of Hungary; the others came seemingly from the Balkan peninsula, pioneers of vast hordes behind, who in 1438 began to pour ever Germany, Italy, and France, by thousands instead of hundreds, and headed this time by King Zindl. Spain they reached in 1447, Poland and Russia about 1501, Sweden by 1512, England by 1514, and Scotland by 1505, or very possibly fifty-six years earlier, for an act of 1449 refers to 'overliers and masterful beggars' as going about the country with 'horses, lunds, and other goods.'

For western Europe, then, the year 1417 does mark an era in Gypsy history; but how long before that date there had been Gypsies in southeastern Europe remains a mystery. We recognise them dimly in Crete in 1322 as dwellers in 'little.

nark an era in Gypsy history; but how long before that date there had been Gypsies in southeastern Europe remains a mystery. We recognise them dimly in Crete in 1322 as dwellers in 'little, oblong, black, low tents, like those of the Arabs,' and in eaves; at Constantinople about 1050 as 'descendants of the race of Simon Magus, Atsinkan by name, soreevers and famous regues;' and there, too, in \$10 as Athinganoi, magicians, soothsayers, and serpent charmers. Beyond any shadow of doubt, we find them prior to 1346 on Corfu; about 1378 at Namplion, in the Peloponnesus, receiving a renewal of former privileges; and prior to 1370 in Wallachia, whose woiwode then granted forty tents of Acigani to the monastery of Voditza—i.e. the Roumanian Gypsies were already serfs, and serfs they continued till 1856. Then, in a free metrical paraphrase of Genesis, made in German about or before the year 1122 by an Austrian monk, and cited by Freytag in Bilder aus der deutschen Vergangenheit (ii. 226, 1859), the following passage occurs: 'So she (Hagar) had this child, they named him Ishmael. From him are descended the Ishmaelitish folk. They journey far through the world. We call them chaltsnide ('workers in cold metal'). Ont upon their life and their manners! For whatever they have to sell is never without a defect; whenever he (sic) buys anything, good or bad, he always wants something in; he never abates on what he sells himself. They have neither house nor country; every place is the same to them. They roam about the land, and abuse the people by their knaveries. It is thus they deceive folk, robbing no one openly.' That Gypsies were meant here, likely as it seems at first sight, is rendered doubly likely by the fact that the names Agariens and Agareni are expressly applied to Gypsies by Lusignan and Fritschius in 1580 and 1664, and that in German and Danish thieves' slang Geschmeilim and Smaelem (Ish

maelites) are terms for Gypsies at the present date. Finally, the *kōmodromai* ('village-roamers') of Greek writers were probably Gyp-ies. The term is a vague one, but no vaguer than *landlooper*, which does in Dutch stand for 'Gypsy.' And the kömodromoi, we find, were both conper and gold smiths, roaming about the country, and using bellows made of skins, like those of Hard's Naupliote Gypsies in 1497. The verb kingdromein course in Balloy, who though the property of the standard standard the standard standard the standard standard the standard through the komodromein occurs in Pollax, who flourished about 183 A.D.; and Theophanes Isaurus (758-818 A.D.) speaks under the date 544 A.D. of a komodromos from Italy. A kāmodromos figures, morcover, in a Greek aporryphal gospel of mascertained date as helping to erneify Christ, which at once recalls the current Montenegrin legend that the founder of the Gypsy race was accursed for having forged the nails for the crucifixion.* Thus, on the one hand, it is certain that in Wallachia the Gypsics were already reduced to hondage in 1370; it is almost certain that Gypsies were nothing new in Austria in 1122; and it is at least highly probable that more than a thousand years aga there were Gypsies roaming through the Byzantine empire. On the other hand, of the Gypsies passage of the Bosphorus, and their first arrival in Enrope, no record has yet been discovered.

From numbers of scattored notices we may safely infer that the Gypsies in early times possessed every art that they possess to day, with many besides since lost. Thus, in Scotland in 1580 they 'dan-sit before the king in Halyrndhouse;' between 1559 and 1628 they yearly 'acted severall plays' at Roslin, where Sir William St Clair, Lord Chiefjustice, 'allowed them two towers for their residence, the one called Rohin Hood, the other Little John; 'in 1726 they east the church bell at Edzell, in Forfarshire; about 1740 in the Border country, they prestiged appropriate a property. country they practised engraving on pewter, lead, and copper, as well as rude drawing and painting; and during that century they were famous as fiddlers and pipers, and they worked the small iron-foundry of Little Carron, near St Andrews, In England, again, in 1549 they were capable of counterfeiting the great seal; in Hungary they made hullets and cannon-balls in 1496 and 1565; and there, too, we find them celebrated as musicians as early as the 15th century. A gifted and insinuating race, equal—nay, often superior—to the nations whose lands they roamed, the early Gypsies met with a good reception, as from kaiser and pope on the Continent, so in England from the Earl of on the Continent, so in England from the Eart of Surrey, who about 1519 entertained 'Gypcions' at Tendring Hall, Suffolk; in Scotland from James IV., who in 1505 gave Anthonius Gaginus, 'Earl of Little Egypt,' a letter of commoudation to the king of Denmark. In Scotland, too, in 1540, James V. recognised the right of 'onre louit Johnne Faw, lord and erle of Litill Egipt,' to avenue institute many his commany and folk, conexecute justice upon his company and folk, conform to the laws of Egypt. Indeed, it were easy to multiply proofs that Gypsies at a much later date have been held in consideration and regarded with interest. Charles Bosvile, a Gypsy 'king,' who was buried in 1709 at Rossington, Yorkshire, had £200 a year, and 'was a mad spark, mighty fine

* The Gypsies of both Alsace and Lithuama have a legend of their own that a Gypsy stole one of the four nails with which Christ was to be crucified, and that therefore God gave them express permission to steal. This curious legend offers a possible explanation of the hitherto unexplained transition from iour nails to three in Caucifixes (q, v.) during the 12th and 13th centuries. The earliest known example of this daring innovation is a copper crucifix, of securingly Byrantine workmanship, dating from the close of the 12th century. Now, if Gypsies had then, as now, a practical monopoly of metal-working in southeastern Europe, that crucifix must have been fashened by a Gypsy, when the three nails would be an easily intelligible protest against the libel that those mails were forged by the founder of his race.

and brisk, keeping company with a great many gentlemen, knights, and esquires; 'Queen' Margaret was visited at Norwood in 1750 by the Prince and Princess of Wales, and Lazaus Petnléngro at the Liverpool Exhibition of 1886 by Prince Albert Victor; whilst the Archduke Josef of Anstro-Hungary is a prince among Romany Ryes (or 'Gypsy gentlemen'), as Gypsies designate lovers of their race. Still, liking and pity changed sooner or later to enouty and distrust. For the knaveries of the first immigrants were copied by their succesof the first imagnates were copied by their successors, and to actual malpractices, charges, more or less baseless, were added—they were kidnappers, cannibals, emissaries of the Turks. The last charge is as old as 1424, the second as 1547, and the first as 1629. Gypsies were used as spies by Wallenstein and Frederick the Great, but of cannibalism and child-stealing there is no just ground to suspect them, though for cannibalism forty-five tered, or hanged in 1782, for child-stealing forty-seven German Gypsics imprisoned in 1872. The Hungarian Gypsics were racked, beheaded, quarcharge in each case proved false. Truly, any wrong-doings of the Gypsies fade into insignificance by the side of the wrongs that were done them. In Germany so lately as the first half of the 18th centary, they were hunted down like wild beasts; in one Rhonish principality, says Freytag, beasts; in one trhemish principality, says Freytag, the record of a day's 'bag' includes, among other game, 'a Gypsy woman with her sucking-child,' England and Scotland were comparatively merciful, yet at Durham in 1592 'Simson, Arington, Fetherstone, Fenwicke, and Lanckaster were hanged for being Egyptians;' at Banff in 1701 three young Egyptian rogues were sentenced to have their cars cropt, be publickle scourged through the tonne, burnt upon the check by the executioner and benefited the above for the control of the control of the check by the executioner, and banished the shyre for ever mider the paine of death.' Such are two samples of the cases whose records have come down to us, few probably in proportion to the cases whose records are lost; anyhow, these show that in England and Scotland fully four-score men and women were hanged or drowned between 1577 and 1701 for the offence of being what Nature had made them. The penal laws passed against the race between 1530 and 1596 were repealed in 1784; but even in 1819 it was carried unanimously at the Norfolk Quarter Sessions 'that all persons wandering in the habit or form of Egyptians are punishable by imprisonment and whipping. One important factor in the geographical distribution of the Gypsies has been deportation-from England to France and Norway (1544); from Scotland to Barbadoes and the American plantations (1665, 1699, 1715, &c.); from Portugal to Africa till 1685, and thereafter to Brazil; from Spain to Louisiana (some time prior to 1800); and from the Basque country cn masse to Africa (1802).

At Tobolsk in 1721 Bell of Antermony came across sixty Tsigans, journeying from Peland to China; in 1851 a hundred Hungarian Gypsies passed through Frankfort cn route for Algeria; since 1866 large hands of Calderari, or Gypsy smiths from sonth-eastern Enrope, have made the round of the Continent, visiting Norway, England, even Corsica; in 1879 fex-wearing typsies were camping in Sweden; and in 1886 ninety-nine 'Greek' Gypsies were stopped at Liverpool on their way from Corfn to the United States. Thus the nomad instinct survives, and with it a marvellous faculty for picking up foreign languages—a Hungarian Gypsy will speak even Basque like a native. British Gypsies, however, hardly ever visit the Continent; and almost everywhere there are sedentary as well as nomadic Gypsies, though in what proportion it were hard to guess. Sometimes they go into houses only for the winter, but some-

times the house or cave (not tent or caravan) is their permanent abode. Nay, it is enrious that, though there certainly were Gypsy tent-dwellers in Wallachia in 1370, at Ratisbon in 1424, as there are to day in Persia and America and in all intermediate lands, still, as a rule, the early chroniclers are silent as to Gypsy tents; and the word for 'tent' differs in almost every Rómani dialect,

indeed is oftenest a borrowed term.

There are few trades that Gypsies have not somewhere or at some time turned their hands to. In England the writer has known them to follow the callings of clergyman, billiard-marker, Salvationist, hetting-man, quack-doctor, chinney-sweep, gun-maker, pugilist, actor, carpenter, calman, &c., awell as of hawker, knife-grinder, showman, and But everywhere the men follow the three specifically (typsy callings of horse-dealers (slave-dealers in Brazil, too, formerly), musicians, and workers in metal; everywhere the women are adepts at fortune-telling. Their musical talent workers in metal; everywhere the wonten are adepts at fortune-telling. Their musical talent has rendered them famous as harpists in Wales, as singers in Moscow, as violinists in Hungary; and from Hungary since 1878 their fame has extended to Paris, London, Liverpool, Edinburgh. There are no such players of the czardas; still Liszt's theory that Hungary owes its national music to the Gypsies has been impugued by competent authorities. What then of the paradoxical claim, put forward by M. Bataillard, that Enrope -at anyrate northern and western Europe-is indebted to prehistoric Gypsies for its knowledge of metallurgy—i.e. for everything that makes life livable? If we examine this claim, the paradox sensibly diminishes. On the one hand, Sir John Lubbock, without a thought of the Gypsies, had in 1865 heen led to the independent canclusion that the art of making bronze was introduced into Europe from the East by a small-handed race like the Egyptians or the Hindus, a nomal race too, who practised the self-same methods in different lands, and who, whether acquainted or not with tands, and with, whether acquainted or not with iron, were exclusively workers in bronze. What race this was he leaves an unsolved problem, except that it certainly was not the Phunicians. On the other hand, the Gypsies of south-eastern Enrope and Asia Minor enjoy a practical monopoly of metal-working. So exclusively is the smith's a Gypsy (and therefore a degrading) craft in Mon-tenegro that, when in 1872 the government established an arsenal, no natives could be got to fill its well-paid posts. In 1880 Mr Hyde Clarke wrote in a letter that 'over more than one sanják of the Aidin viceroyalty the Gypsies have still a mono-poly of incorpoling the negligible of when its production. poly of ironworking, the naalband, or shoeing-smith, being no smith in our sense at all. He is supplied with shoes of various sizes by the Gypsies, and only hammers them on.' In 1856 Mr Gardner, consul at Jassy in Moldavia, described the Gypsics as 'the blacksmiths and locksmiths of the country;' in Transylvania, says Boner (1865), 'Gypsies are the best farriers, and as blacksmiths generally they excel. All the ironwork of a village is done by them.' Add to this, and much more of the sort Add to this, and much more of the sort might be quoted, the fact that very many of the early notices of Gypsies, some of which we have cited, refer to their skill in metallurgy. Next, put two and two togother, though many important links in the chain of reasoning are necessarily writted have for your together. omitted here for want of space. Suppose that there were prehistoric Gypsies in Europe (and history knows nought of their arrival), that they were normad sniths, like the kömodromoi of the 7th century A.D., the 'Ishnaelites' of the 12th century, and the Hungarian Calderari who visited Norway in 1874; that they were workers in bronze, to the exclusion of iron, like the Gypsy 'Zlotars' to-day in eastern Gallicia (bell-founders these, like

the Scottish tinklers of 1726, and goldsmiths, too, like the kömodromoi)—supposing all this, we say, then have we not possibly identified the unknown race, small-handed like the Gypsies, and, like the Gypsies immigrants from the East? An objection, raised by the writer in 1878 to Bataillard's theory, is that in every Gypsy dialect of Europe nearly all the metallurgical terms seem to be directly borrowed from the Greek: pétalo, 'horseshoe' (pétalon); kulài, 'tin' (kulatón); khārkoma, 'copper' (chālkoma); kukkavi, 'kettle' (kakkābē): moliv, 'lead' (molybdos); rin, 'file' (rinē); and half a dozen more. This looked like an insuperable objection; for how, unless the Gypsies had adopted the farrier's craft sinee their arrival in a Greckspeaking country, should their word for 'a horse' be Indian, for 'a horseshoe' Greek? But, Bataillard contends, the converse may be the case, the Greeks may lave borrowed their terms from Rómani. Čertainly, the occurrence of pedol in Welsh (12th century, pedhaul), for 'horseshoe.' looks like more than a mere coincidence; and gh'ala, the word for 'tin' with Asiatic Gypsies, seems to forbid our deriving kaláir from kalaion. Anyhow, Bataillard's theory is gaming favour with fareign arehaeologists, among whom MM. Mortillet, Chantre, and Burnouf had arrived independently at similar conclusions.

The counter-theories as to the origin of the Gypsies need not detain us long. There is the Tamerlane theory of Grellmann (1783), according to which the Gypsies first reached Europe in 1417.

The counter-theories as to the origin of the Gypsies need not detain us long. There is the Tamerlane theory of Grellmann (1783), according to which the Gypsies first reached Enrope in 1417—a theory disproved by firmly-established facts. There is the Behram Gur theory of Pott and Bataillard (who since relinquished it), developed in 1844-40, and adopted by Newbold, Sir Henry Rawlinson, De Goeje, Sir Richard Burton, and an Edinburgh Reviewer (July 1878). According to this theory, ahout 420 A.D., Behram Gur imported 12,000 Jat minstrels from India to Persia, and their descendants, gradually wandering westward, entered Europe in 1025 or as late as the beginning of the 14th century. Pleasible, and it may be containing a modicum of truth, this theory fails as a whole in view of the marked unlikeness of Játaki, the language of the Gypsies. Lastly, attempts have been made, on the ground for the most part of a similar labit of life, to identify the Gypsies with various Indian vagrants—e.g. by Richardson with the Nāts (1803), by R. Mitra with the Bediyás (1870), and by Leland and Grierson with the Poms (1873-88). Even if successful, such identification would prove little more than that India, like Egypt, has its Gypsy tribes—a fact in itself extremely probable, but so far lacking linguistic earroboration

Languaga.—What their religion has been to the Jews, that their language is to the Gypsies—a bond of nuiversal brotherhood. For Gypsies everywhere speak the self-same Romani chiv ('Gypsy tongne'). Their words for 'water' and 'knife' are in Persia pāni, cheri (1823); in Siberia, panji, tschuri (1878); in Armenia, pani, churi (1864); in Egypt, pāni, chūri (1856); in Norway, pani, tjuri (1858); in England, pani, churi (1830); in Brazil, panin, churi (1886)—where spelling and dates are those of the works whence these words have been taken. But over and above their identity—and there are hundreds more like them—in every Gypsy dialect, they are identical with the Hindustani pani and churi, familiar to all Anglo-Indians. To cite but a few more instances, 'nose,' 'hair,' 'eye,' 'ear' are in Turkish Romani nak, bal, yak, kann, in Hindustani, nak, bal, akh, kan; whilst 'Go, see who knocks at the door' in the one language is Jâ, dik kon chalavēla o vudār, and in the other Jâ, dekh kon chalavāda o vudār, and in the other Jâ, dekh kon chalavāda o Tlis discovery was not made

till long after specimens of the Gypsy language had begun to be published-by Andrew Boorde (q.v.) negun to be phinished—by Andrew Boorde (q.v.) in 1547, whose twenty-six words, taken down seemingly in an English alchouse, were intended to illustrate the language of Egypt; by Bonaventura Vnleanius (1597), whose vocabulary of seventy-one words, collected probably in Belgium, fills up some blank pages in a work on the Goths; and some blank pages in a work on the Goths; and by Ludolphus (1691), whose thirty-eight words are embedded in a history of Ethiopia. First in 1782 Rüdiger in Germany, followed next year by Grellmann, and in England (independently) by Marsden, observed the resemblance of Rómani to Hindustani; and Grellmann straightway leaped to the conclusion that the Gypsics who showed themselves in western Europe in 1417 had newly come also to south-eastern Europe, and were a low-easte Indian tribe expelled from their native country about 1409 by Tamerlanc. In 1783 the older languages of India were a scaled book to Europeans, and Grellmann's opinion found almost manimous approval for upwards of sixty years; but thanks to the lin-guistic labours of Pott, Ascoli, and Miklosich, combined with the historical researches of Bataillard, the question has now assumed a new aspect. For while on the one hand it has been proved that Europe had its Gypsies long before 1417, so on the other Rómani has been shown to be a sister, not a daughter—and it may be an elder sister—of the seven principal New Indian dialects. Not a few seven principal New Indian dialects. Not a few of its forms are more primitive than theirs, or even than those of Pali and the Prakrits—e.g. the Turkish Rómani rast, 'hand' (Sansk. hasta; Pali, hattha), and rusht, 'lip' (Sansk. ostha; Pali, ottha), Miklosich, however, has pointed out that many of these seemingly archaic forms in Rómani may be matched from the less-known dialects of India, especially north-west India—that we find, for example, in Dardu both hast and usht.

In the Rómani vocalmlary (five thousand words rich perhaps), besides the Indian elements that constitute its basis, there is also a largish percentage of borrowed words—Persian, Armenian, Slavonie, Roumanian, Magyar, &c. Thus, the Euglish dialect has ambril, 'pear' (Pers. amrād); grāsni, 'mare' (Arm. grast, 'beast of burden'); paramisin, 'scandal' (Mod. Gr. paramāthi, 'story'); hālevas, 'stoekings' (Slav. choleva); vari, 'any' (Roum. vare); and stiff-pen, 'sister-in-law' (Ger. stief'). These words and the like are a record of the route by which the Euglish (typsics arrived in England; and as the fifty Greek and the thirty Slavonic words outnumber all the other borrowed words put together, it follows that the Gypsies tarried longest in Greek- and Slavonic-speaking lands. Again, dron, dran, or dron (Gr. drōmos) is the Rómani word for 'road' not only in England, but in Turkey, Roumania, Hungury, Bohemia, Poland, Lithuania, Russia, Seandinavia, Germany, Italy, Spain, and Brazil; and the like holds more or less good of the Gypsy words for 'Sunday,' 'chair,' 'hat,' 'anger,' 'hone,' 'soup,' 'pawn,' &e. fron the Greek; for 'pease,' 'beer,' 'inn,' 'cat,' 'cloak,' &e. from the Slavonic. This is important as indicating that the modern Gypsies are descended not from successive waves of Oriental immigration, but all from the Slavonic. This is important as indicating that the modern Gypsies are descended not from successive waves of Oriental immigration, but all from the self-same European-Gypsy stock, whenever that stock may have first heen transplanted to Europe. It conclusively negatives a theory like Konnavine's, that the Italian, Spanish, Basque, and French Gypsies arrived at their present habitats by way of Africa, and the Scandinavian Gypsies by way of the Ural Mountains. Still more important is the question of the presence or the absence of Arabic words in Enropean Rómani. According to De Goeje (1875) there are ten such words; according to Miklosieh (1878)—and rightly as it seems—there are none.

the two scholars has perceived the possible importance of the presence or the absence (especially the absence) of Arabic clements. Rómani undoubtedly contains Persian words; would it not have certainly contained also Arabic words if the ancestors of our modern European Gypsies had sojourned in Persia, or even passed through Persia, at a date later than the Arab conquest of Persia? If Miklosich is right in his contention that there are no Arabic words in European Rómani, it follows almost inevitably that the Gypsies must have passed through Persia on their way to Europe at some date prior to the middle of the 7th century A.D. In this connection it should be pointed out that the dialect of the Gypsies of Asia Minor differs far more, alike in grammar and in vocabulary, from that of the Gypsies of Turkey than does the latter from that of their brethren in Wales.

The Gypsies of Montenegro are said to have completely lost their language; elsewhere Rómani has suffered more in grammar than in vocabulary. has suffered more in grammar than in vocabulary. In Spain, in Brazil, in Scotland, and in Norway its gennine inflections have been wholly or almost wholly superseded by those of Spanish, Portuguese, English, and Norwegian. In England this process is still going on, affording an unquestionable instance of 'mixed grammar,' such as Max Muller has pronounced an impossibility. There is every variety of shade from almost absolute parity of variety of shade, from almost absolute purity to variety of shade, from almost absolute purity to as almost absolute corruption. Thus, a Welsh Gypsy writes in a letter, Dava ma temen borro parchyben for temorro cambo drom ('Give I you great thanks for your loving way'); and an English Gypsy, Mandy kek gin so to pen ('Me not know what to say'), where the pure Rómani would run, Kek ne jindua me so to pendu. No Gypsy dialects have been better preserved than those of Turkey at one end of Europe, and of Wales at the other and: from a comparison of these it is easy other end; from a comparison of these it is easy to see how little they can have altered since the aucestors of those who now speak them parted company five centuries ago. Thus, the twenty-one forms in Turkish Rómani of the third personal proforms in Turkish Rómani of the third personal pro-noun (mase, fem., and plur.), with two exceptions, reappear almost or quite unchanged in the Welsh dialect. The plural, for instance, runs in Turkish Rómani, of, 'they;' len, 'them;' léngoro, 'their;' léndhe or lénghe, 'to them;' léndja, 'with them;' léndor, 'from them;' and in Welsh Rómani the corresponding forms, occurring in letters written by a self-educated Gypsy, are yon, len, lengo, lendy and lengey, lensu, and lendo. Four of the cases, it will be seen, are formed by suffixing postpositions to be seen, are formed by suffixing postpositions to the accessative; and this, too, holds good of the nouns. Many of the verbal inflections are almost nouns. Many of the verbal inflections are almost equally simple, and may be as readily analysed by means of Rémani itself. In the final syllables of did-ra, 'I give;' di-sa, 'thou givest;' and di-la, 'he gives,' we recognise the first, second, and third pronouns. From the past participle dino and isom or hom, 'I am;' isomas or homas, 'I was,' are formed diniom, 'I gave;' and diniomas, 'I had given'—formations recelling those of Latin denongiven '-formations recalling those of Latin deponents. The future, formed by prefixing kama ('will') to the present, as kamadáva, 'I will give,' was modelled probably on the Modern Greek thélō

or the.
So far, our ablest Gypsiologists are divided in opinion as to the prohable antiquity of Rómani. On the one hand Aseoli maintains that, 'having retained certain nexus, or combinations of consonants, which had almost wholly disappeared at the epoch of the oldost known Prakrit texts, this lowly idiom horein surpasses Pali itself in nobility, and more nearly approaches Sanskrit.' Miklosich, on the other hand, contends that 'from the agreement of Rómani in so many important points with the

modern Aryan languages of India, it follows that the emigration cannot have taken place till after the formation of the latter—i.e. till after the Prakrit period, in which the old system of declension was still recognised; since one is hardly inclined to assume that Rómani, severed from its most nearlyrelated idious, developed itself in the self-ame manner as they. In his Comparative Grammar of the Modern Aryan Languages of India (3 vols. 1872–79) Mr Beames arrives at a similar conclusion, that 'the language of the Gypsics is purely Aryan in its structure, and Modern Aryan too, being in many respects quite as far removed from the old synthetical system as any of the seven languages now under discussion.

Names.—Alike in Turkey and England, in Finland and Italy, the Gypsy calls himself Rom ('man' or 'husband'), from which come Romni ('female Gypsy,' 'woman' or 'wife') and the adjective Romano ('Gypsy'). In Asia Minor the form is lon, and in Syria down, which comes very near the Sanswith dona and modern Indian dom, 'a low-caste musician.' The latter is clearly a secondary meaning, and 'man' the primary; so that one is almost tempted to connect Rom with the ancient Egyptian with the ancient Egyptian rome, 'man' (Rawlinson's Herodotus, ii. 225), and to believe that there really is something in the alleged Egyptian origin of the Gypties. That belief was assuredly current in south-east Europe prior to their westward migration, and is current to-day from Armenia to America, having been stereotyped from Armenia to America, having heen stereotyped in such mames as the modern (neek Gyphtoi, the Albanian Jerk, the Turkish Farāwni and Magyar Phurao nėpe ('Pharaoh's folk'), the English Gypsy, and the Spanish Gitano. Another very widespread name is the Syrian Jingánih, Modern Greek Atsinkanoi, Turkish Tchinghiant, Magyar Tzigany, German Ziganer, Italian Zingaro, &c., perhaps identical with the Persian zingar, 'a saddler.' We can merely glance at the infinite variety of names applied to the Gypsies in different ages and different localities—e.g. Heiden ('heathen'), Saraceni, Nubiani, Uaii, Cilices, &c. by early writers, and the Persian Karachi ('swarthy'), the Modern Greek Katzibeloi, the Cypriote Kilindjiridės, the French Bohėmiens, and the Scandinavian Tatere ('Tartars'). Only, if under these manifold and frequently misleading names we can safely recognise Gypsies, it is at least just possible that we should also recognise them in the Dynamitters (traders from foreign parts who sold known vale at Win also recognise them in the *Dynamitters* (traders from foreign parts who sold brazen pots at Winchester fair in 1349), in the *Bemische* ('foreigners' at Wurzburg about 1388; ('ypsies incontestably at Frankfort in 1495); in the tent-dwelling refugees from Hugary and Lorraine, who are said to have discovered the Stourbridge fireelay about 1555; or even in the Kenites, nound tented tinkers and blacksmiths in ancient Palestine (cf. Sayce and Nenbauer in the Academy, Nov.-Dec. 1886). In England, common Gypsy surnames are Boswell, Buckland, Cooper, Gray, Herne, Lee, Lovell, Smith (Petuléngra), and Stanley—assumed, some at least, probably from former patrons of the race. Among their 'Christian' names are Mantis, Pernn, Plato, and Pyranms; Delarifa, Meralini, Memberénci, Perpénia, and Sinaminti. Songs and Ballads.—Chin, Romani for 'write,' means literally 'ent,' so points back to a dim antiquity, still the Gypries have neither abbellet.

tiquity; still, the Gypsies have neither alphabet nor literature. Many Romani songs, however, have been taken down in Spain, Hingary, Roumania, and elsewhere—ballads, love- and dance-songs, and threnodies. The last, collected in Transylvania by Wlislocki, are instinct with pathos and poetry; but the rest, rude in rhyme and in rhythm, as a rule have only a linguistic value. The famous rule have only a linguistic value. The famous 'Pharaoh lay' is known to us only through a very corrupt fragment. The case is otherwise with

Gypsy folk-tales, of which nearly 200 have been collected since 1862 in Turkey, Roumania, Austro-Hungary, Wales, &c. A meagre store, yet sufficient to enable us to arrive at certain definite conclusions. First, in different collections we meet with variants of one and the same story—e.g. three of 'The Valiant Little Tailor,' and three of 'The Master Thief.' Secondly, many (perhaps most) of the Gypsy stories are identical with, though not seldon superior to, stories current amongst non-Gypsy races. Thirdly, there are certain episodes in Gypsy stories, and certain whole Gypsy stories, for which diligent research has failed to produce any Fourthly, a number of non-Gypsy stories present strong internal evidence of the probability of their Gypsy origin. Now, as early as 1856 the Gypsies were termed the 'rhapsolists of Moldo-Wallachia;' in Turkey Gypsies are professional story-tellers; their stories there are proved to be 'very old' by their retention of otherwise forgotten Rómani words; in the Scottish Highlands a tented tinker was one of Campbell's four principal sources; and finally, according to Benfey, Ralston, Coquin, Clonston, and other folklorists, most of the popular stories of Europe are traceable to Indian sources (see FOLKLORE). But how? by what chan-

nels?—one channel, perhaps, was the Gypsies.

Religion.—Of the Gypsies' religion not much need be said, as they do not possess one. They probably had one at starting; but, if so, they lost it by the way. In spite of frequent statements to the contrary, Rômani has words for God, devil, soul, heaven, eross; but trushul, 'eross,' originally stood for Siva's trident. So, too, their folklore enshrings many strange survivals of dead heatherny—of tree and scrpent worship, of phallicism, tabu, and the vampire superstition. But everywhere Gypsies profess the faith of the land of their adoption— Mohammedan, Orthodox, Catholic, Protestant. They bring their children to baptism, and are scrupulous in the matter of Christian sepulture. At Steinbach in 1445 the 'high-born Duke Panuel' was buried beneath a sentcheoned monument; at Dayton, Ohio, in 1878, 'Queen' Margaret Stanley was borne with regal honours to the grave; and scores of similar cases could be eited in England, where at Malmesbury in 1657 'John Buccle, a gypsie, was buried in King Athelstone's chapel,' and at Steeple Barton in 1794 'Peter Buckland, a great man among the Gypsies, said to be very wealthy, was interred in the chancel. Otherwise, unless for marriages, nor always then, the Gypsies

are not great church goers.

Character.—There are Gypsies and Gypsies. The letter sort are quiek-witted, courteous, likeable, trustworthy when trusted, and lavishly generous with the one hand, though the other may itch for a bargain. Untrannelled by prejudices, and vexed by no lofty ambition, they have picked up a sort of peripatetic philosophy, so lead a pleasant, cuckoo-like existence, and make the best of this life—for a next they have small concern. As to faults, these 'spoilt children of Nature ' are boastful, passionate, crafty, superstitions, thriftless, and indolent; they break most of the Decalogue's precepts, but lightly great criminals are few among them. hoise dealing and palmistry have not proved en-nobling vocations. Piety, which is rare with Gyp-sies, is apt to assume the form of eant; and learnring, which is rarer, of conceit. Indeed, the best Gypsy is the Gypsy au naturel, the life-long tent-dweller in country lanes; and he, like all fcra nature, is threatened with extinction. Gypsies' virtues are largely their own, an ontcome of opening life, their winer country is the convergence. air life; their vices-ascribable to centuries of oppression, which have left them a singular compound of deep-seated gloom and quicksilver light-heartedness—have made them suspicious and hostile

towards all the rest of mankind. 'There's nothing towards all the rest of mankind. 'There's nothing worse,' says the Gypsy, 'than nasty gaújos,' than all, that is, who have not enjoyed the privilege of Gypsy birth. For of that he is genninely prond; he is honestly grateful that he 'hasn't got to live in none of your poverty houses.' Gypsy celebrities, outside the realm of music, have been few. John Bunyan has been claimed as one, but on slender grounds; so have Masaniello and the painter Antonio Solario (1382-1455), nieknamed 'Lo Zingaro.' Anyhow there is Jem Maee, the champion puglilst; and Mrs Carlyle was proud of her Baillie ancestry. ancestry.

Physique.—Early writers all speak of the Gypsies as hideons, but such language is like early travellers' descriptions of Alpine scenery. For the race is a comely one—its most marked characteristics the tawny olive skin, the dark lustions eye, the dazzling teeth, the black or dark-brown hair (often frizzled and somewhat coarse), the thoughtful braw, and the lithe sinewy form, with finely-made hands and feet, and arms short in comparison to the legs. The skull is mesocephalic.

hand's and fect, and arms short in comparison to the legs. The skull is mesocephalic.

Bibliography.—There are more than 300 books, pamphlets, &c. on the Gypsics; but one and all might have seemed almost valueless beside the 'immonse collections' of Michael Ivanovitch Konnavino (1820–81). A Russian by birth, by profession a medical man, he lived, we are told, during 1841–76 among the Gypsics of Germany, Austria, southern France, Italy, England, Spain, Turkey, northern Africa, Asia Minor, control Asia, Hindustan, and Russia, and ritual songs, enshrining a wealth of mythological and legendary lore. Unfortunately those collections have disappeared, and we know them only through an abstract formed before the collector's death by his friend, Dr A. Elyssoof, member of the St Petershing Geographical Society, and translated from Russian through French for the Gypsy Love Journal (1890). Indian Gypsics have been treated by MacRitchio (1886); Persian by Sir W. Ouseley (1823) and Newbold (1856); Persian by Sir W. Ouseley (1823) and Newbold (1856); Persian by Fett (German, 1846), Sectzu (Gor. 1864), Nowbold (1856), and Everest (1890); Anatolian by Paspati (French, 1870) and Elysseef (1889); Armenian and Siberian by Miklosich (Gor. 1878); Egyptian by Nowbold (1873-82); Central African by Felkin (1889); Algerian by Bataillard (Fr. 1874); Turkish by Paspati (Fr. 1870) and Colocci (Ital. 1889); Romannian by Kogalnitschan or Cogalnitcheanu (Fr. 1837) and Vallant (Fr. 1868); Montenegrin by Bogisic (Gor. 1874); Sorvian by Miklosich (Ger. 1876); Bosnian by Kopponicki (1889); Hungarian by Bright (q.v., 1818) and the Archduko Josef (Hung. 1888); Transylvanian by Wislocki (Gor. 1872–8); Lithmanian by Wislocki (Gor. 1872); Cerman by Liebich (Ger. 1863) and Miklosich (Ger. 1873-8); Lithmanian by Narbutt (Fol. 1830) and Dowojno-Sylvestrowicz (1889); Norwegian by Sundt (Norwe (1881); Danish by Dyrlund (Dan. 1872); German by Liebich (Ger. 1863), and Morth Amorican by Sinson (1865) and Leland (1873-82), Sunert and Crofton (1863-88), and Gro Bibliography. - There are more than 300 books, pamph-Review for July 1888; for costume, Crofton (1876); for metallurgy, Andree (1884); for craniology and physique, Kopernicki (Ger. 1872), Hovelacque (Fr. 1874), and Woisbach (Gor. 1889); for history, Grellmann (Ger.

1783; Eng. trans. by Raper, 1787), Sprengler (Lat. 1839), Hopt (Ger. 1870), Crofton (1888), and, especially, Bataillard (1844-90); and for the language as a whole, Pott (q.v., Ger. 1814-45), Ascoli (Ger. 1855), and Miklosch (q.v., 1872-80). Of these works the fullest of several bibliographics is that furnished by Colocci in the Zingari (Turin, 1889). Painters to whom the Gypsies have furnished subjects have been Caravaggio, Callot. Murland. Phillip, and Burgess; novelists neets. Gypsies have furnished subjects have been Caravaggio, Callot, Morland, Phillip, and Burgess; novelists, poets, playwrights, and composers, Cervantes, Scott, Victor Hugo, George Mercdith, Le Fann, Theodore Watts, Matthew Arnold, George Eliot, Puschkin, Kraszewski, Brachvogel, Richepin, Balfe, Vendi, Brahms, Bizet, &c. (cf. Gosohe, Die Zujenner als Tipus in Dichting und Kunst, 1879). Finally, a vast mass of material is to be found in the quarterly Journal (Edin., Constable) of the cosmopolitan Gypsy Lore Society, which was founded in 1888.

Gypshm is a valuable mineral of a comparatively soft nature. Chemically it is a hydrated sulphate of lime, $CaSO_1 + 2H_2O$. Its specific gravity is 2.31, and its hardness is from 1.5 to 2 of the mineral scale. The massive marble-like variety, which is usually white or delicately finted and translucent, is called Alabaster (q, v,); when transparent and crystallised it is known as Sciente (q, v), and when fibrous and with a pearly coal (q.v.); and when fibrous and with a pearly opal-

escence it is termed satin spar.

Gypsum occurs in various geological formations, and has a wide geographical distribution. Extensive beds of the common variety are generally made up of irregular, concretionary, nodular masses. In the New Red formation near Derby, at Carlisle, and in some parts of Nottinghamshire, as well as in the Tertiary beds of the suburbs of Paris, it is largely worked for the preparation of plaster of Paris. Productive beds of it are found in numerous localities in the United States, principal of the Paris of Paris. pally in Ohio and Michigan; in New Brunswick, Nova Scotia, and Ontario; and in the Punjah. Gypsum is very frequently associated with rock-

Gypsum contains 21 per cent. of water, which can be driven off by heat. It is burned in kilus at or a little below a temperature of 250° F., and afterwards ground to a fine powder, which is called plaster of Paris. This recombines with water, evolves heat, and almost immediately solidifies or sets. It is this property which makes it so serviceable for many purposes in the industrial arts. If in the burning of gypsum the temperature is raised as high or higher than 480° F. it loses the power of as high or higher than 480 F. It loses the power of rehydrating, and is then said to be drad burnt, in which state it will not set when mixed with water. Like gypsum, plaster of Paris is soluble to the extent of rather more than 2 parts in 1000 parts of water at ordinary temperatures, its point of maximum solubility being 95° F. It is therefore mustited for external work, except in dry climates such as that of Persia. For making easts the plaster of Paris is made up with water to a consistency of thick cream. In this state it is poured into a mould, which is usually also made of the same unaterial, and left to solidify. Some oil, such as olive, is brushed over the would to form a parting between it and the east. Plaster of Partin is made as a standard for this parting of the same of of Paris is most extensively used for taking casts of sempture and architectural details, as well as for easts of small objects such as coins, medals, and engraved genns. For pottery moulds it is also largely employed, and it is used to take a first copy from the modelled clay in the production of metal patterns. Large quantities of it are consumed for the mouldings of the internal plasterwork of houses, and for cornice and other orna-For hardened plaster of Paris, such as ments. Keene's cement, see CEMENTS; and for the agricultural applications of gypsum, see MANURES. Gypsum is one of the substances which renders

water hard, and such water is useful in the brewing of some kinds of heer. Pearl hardening, used as a filling in the manufacture of some kinds of paper, is an artificial sulphate of lime, precipitated by sulphuric acid from chloride of calcium. Fictile Irong is plaster of Paris which has been made to aborb beeswax, sperimaceti, and stearic acid, in their melted state.—The average annual production of gypsum in Great Britain is nearly 120,000 tons, value about £48,000. In 1888 the production of the United States was about 96,000 tons; of Nova Scotia, 126,118 tons. For the anhydrous sulphate of lime, see Anhydure.

Gypsy-wort (*Lycopus curopurus*), sometimes also called Water Horehound, is a perennial plant belonging to the natural order Labiata. It is a tall erect branching plant, slightly hairy, with a creening root-stock. It is common in moist places in Britain, the Continent, Russian and central Asia, and North America; and is regarded as a febringe and astringent. It dyes black, and givea permanent colour to wool, linen, and silk, and as long ago as 1578 the Gypsies were fabled to stain their skin with it. The Bugle-weed of North America (L. virginicus) has more powerfully astringent properties.

Gyrfalcon. See FALCON.

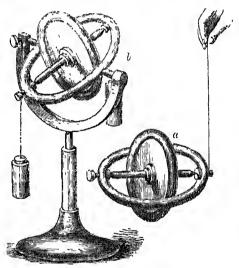
Gyroscope (Greek) is the name given to an instrument for the exhibition of various properties of rotation and the composition of rotations. It differs from a top in having both ends of its axis supported. The invention is probably Freuch or German, and in some of its forms it dates from about the and of the 18th century.

about the end of the 18th century

If a mass be set in rotation about its principal axis of inertia of greatest or least moment, it will continue to revolve about it; and, unless extraneous force be applied, the direction of the axis will remain unchanged. Such, for instance, would be the case with the earth, were it not for the disturbances (see NUTATION and PRECESSION) produced by the sun and moon: the direction of the axis would remain fixed in space. It is for this very reason that modern artillery is rified. If, then, a mass of metal, as for instance, a circular disc, loaded at the rim, and revolving in its own plane, he made to rotate rapidly about its axis of greatest moment of inertia, and if it be freely supported (in gimbals, like the box of a compass), the direction of its axis will be the same so long as the rotation lasts. It will therefore constantly point to the same star, and may, of course, be employed to show that the apparent rotation of the stars about the earth is due to a real rotation of the earth itself in the opposite direction. This application was made by Foucault shortly after his been many years before (March 1836) by Dr Sang (see the Trans. of the R. Scot. Soc. of Arts). It is, in practice, by no means so perfect a mode of proving the earth's rotation as the Foncault pendulum; but this arises solely from unavoidable defects of workmanship and materials. Professor Piazzi Smyth has applied this property of the gyroscope to the improvement of our means of making astronomical observations at sea. A teleof the axis of the gyroscope, will, of course, be almost unaltered in position by the rolling or pitching of a vessel; and a steady horizon, for sextant observations of altitude, may be procured

by attaching a mirror to the support of the gyroscope, and setting it once for all by means of spiritlevels.

But the most singular phenomena shown by the gyroscope are those depending on the composition gyroscope are those depending on the composition of rotations (see ROTATION). Any motion whatever of a budy which has one point fixed is of the nature of a rotation about an axis passing through that point. Hence, simultaneous rotations about any two or more axes, being a motion of some kind, are equivalent to a rotation about a single axis. The effect, then, of impressing upon the frame in which the axis of the spinning gyroscope is suspended a tendency to rotate about some other axis, is to give the whole instrument a rotation about an intermediate axis; and this will coincide more nearly with that of the gyroscope itself, as the rate of its with that of the gyroscope itself, as the rate of its rotation is greater. The compound motion consists in the rolling of an imaginary cone fixed in the gyroscope upon another fixed in space; the rotation of the axis of a top round the vertical (when it is not 'sleeping' in an npright position), and the precession of the carth's axis, are precisely similar phenomena. Thus, when the gyroscope is spinning, its axis being horizontal, a weight attached to the framework at one end of the axis (fig. b) makes the whole rotate about the vertical: attached to the other end, the rotation the vertical; attached to the other end, the rotation takes place in the opposite direction. And the framework may be lifted by a string attached near



Gyroscope.

one end of the axis (fig. a) without the gyroscope's falling. Its axis still projects horizontally from the string, but it revolves as a whole round the string. Various other singular experiments may be made with this apparatus; and others, even more curious, with the gyrostat of Sir W. Thomson, which is simply a gyroscope enclosed in a rigid case, by which the ends of its axis are supported. gyrostat is made the bob of a pendulum under certain conditions, the plane of vibration of the pendulum turns, as in Foucault's celebrated experiment, but in general at a much greater rate.



the eighth letter in our alphabet, is derived from the Phonician letter cheth, which was obtained from the Egyptian hieroglyphic symbol which goes by the name of the sieve (see ALPHABET). The Semitic name, which means a 'fence' or 'palisade,' is explained by the form of the letter

 \Box , which resembles a three-barred stile. The sound was that of a strongly-marked continuous guttural, produced at the back of the palate, which does not exist in English, but is heard in the Scotch loch and the German lachen. When the Phomician alphabet was transmitted to the Greeks the name cheth became $\bar{c}ta$. As early as the 7th century n.c. this sign had two values among the Greeks; it normally represented the long \bar{c} , but was permissively used for the simple aspirate h. In the alphabet of Italy it was used exclusively for the aspirate; but in the later alphabet of Greece the two sounds came to be represented by a differentiation of the symbol, the form H being need for the vowel and the mutilated forms +, +, for the aspirate. Hence we see how the symbol H stands for h in the Latin alphabet and for \bar{c} in the Greek.

In Old English h was a guttural, or throat sound, but it gradually softened down to a spirant, and has now become almost a vowel. No lotter is more misused, and this misuse is of very ancient date. In Latin MSS, and inscriptions it is sometimes improperly inscreted, as in the words harem, harmdo, hauctoritas, or improperly omitted, as in omini, abitat, onustus—spellings which prove the uncertainty of the usage. In English as early as the 12th century we find and written for hard, and hold for old. Americans, as a rule, rarely misuse it, and in England an untaught peasant is usually more correct than a self-made man. It has long disappeared from Italian, and is now rapidly vanishing from French. The Spaniards substitute h Inta Latin f, the Spanish high representing the Latin filius, just us the Latin hordeum represented the Sabine fordeum. Not only f, but c and s are frequently represented by h. Thus, hundred and century, heartiness and cordiality, hall and cell are true doublets, while the Latin canis, centum, and caput correspond to the English hound, hundred, and head, and the first syllables of hexagon and heptarehy, which are derived from the Greek, correspond to the English numerals six and seven. We get hemi-sphere from the Greek and semi-circle from the Latin, happer-critical from the Greek and super-ficial from the Latin. The Irish have retained s, which in Welsh has fuded dewn to h, the Welsh hen, 'old,' being the Irish sen and the Latin sence. In English h has been lost in the words it, loaf, neck, ring, tear, fee, which were formerly written hit, hlaf, huecca, hring, taher, and fooh, while in droht and genoh, now written draft and enough, it has beeome f, and in the words huge, wharf, whelk, and whelm it is intrusive. In habit and haveol, and unany other words, the decay of the aspirate caused them to be written white and veheel, and except in the north of England the h in these words is hardly heard. In the west

and south of England, which are Saxon, the aspirate as a rule is fainter and more liable to be lost than in East Anglia, Yorkshire, and Scatland, where we have the descendants of Angles and Danes.

The correct pronunciation of this difficult letter is one of the most delicate tests of good breeding. The quality of the sound depends partly on that of the following vowel, and its intensity to some extent on the accentration. The aspiration is stronger in himble than in humlity, in himan than in humane, in history than in historical, in hostile than in hostility, but it is the same in happy and happiness, since the accent rests on the same syllable. It is stronger in who than in when, in hole than in whale. In honour it is very faint, in hole than in whale. In honour it is very faint, in honourable and homesly it is almost inaudible. It is stronger in host than in hospital, while in hoster it has so completely disappeared that the spelling ostler has been lost in arbour. It is retained in harbour, but has been lost in arbour. It is retained in harrand hare, but is evanescent in heir and hour, though retained in hereditary and horologe. No general rule can be laid down for the pronunciation; it depends on the usage of good saciety, which changes from generation to generation. In good French society the aspirate is disappearing; in England and America the reverse is probably the case. The reasons why persons who unit h where it should be inserted and commonly insert it where it should be inserted and commonly insert it where it should be onitted are obsence, but have been referred by Mr Donse in his book on Grimm's Law to what he designates as the Principle of Cross Compensation.

In German unusical notation the letter II is used to denote B matural, the letter B being applied to our B flat. This anomalous distinction is derived from the ancient notation by letters, before the invention of the stave, in which B natural was written in a square form (B quadratum), like a small black-letter 6, while B flat was written as a Roman b (B rotandum). The awkwardness of having two B's led to the introduction of the H, which in small black letter (5) resembles 5 closely. See 'Accidentals' in Grove's Dictionary. In the French and Italian system the same note is denoted by the syllable Si. See Music, Scales, Solesageo.

Hang, Carl, German painter, born 20th April 1820, at Erlangen, studied at Munich (under Cornelius) and at Nome. In 1847 he settled in England, at the same time abandaning oil for water-coloms. His earlier pictures represented scenes from Tyrol and Dahuatia, and from the life of the English royal family in Scotland. His later works have been mostly illustrative of oriental subjects, such as the life of the Bedouin of the desert, the ruins of Baalbek and Palmyra, and similar themes.

Haarlem, a town of Holland, 10 miles W. of Amsterdam, is intersected, like most Dutch towns, with canals and avenues of trees. Of its churches the principal is the Great or St Bavon's, a Late Gothic basilica, built in the 15th century, one of the largest churches in Holland, and specially noted for its lofty tower and its organ (1738), long esteemed the largest and finest ever constructed.

Before the church stands a statue of Laurens Coster (q.v.), to whom his countrymen ascribe the invention of printing. The town-ball, formerly the residence of the Counts of Holland, has portraits by Franz Hals, and a valuable collection of early printed works. The Teyler Institution promotes the study of theology, natural science, and the fine ats. Although Haarlem is no longer celebrated, as it was in the 17th century, for its flourishing trade, it still weaves cotton, casts type, bleaches linen, and carries on an extensive trade in flowers, especially in tulips, byacinths, and other bulbs. It was a flourishing town as early as the 12th century, when it took an important part in the wars between the Hollanders and West Frisians. At the close of the 15th century it was deprived of its privileges by Albert of Saxony, and it suffered severely during the revolt of the peasantry (1492). During the war of independence it underwent a seven months' siege (1572-73) from the Spaniards, in which the citizens displayed the noblest heroism. The wood of Haarlem is a favourite place for recreation; in it stands the 'pavilion,' which contains the colonial and industrial museums and a collection of modern pictures. Pop. (1876) 34,132; (1889) 50,974.

Haarlem Lake, which is now drained (see POLDER), lay between the towns of Haarlem, Leyden, and Amsterdam, and communicated with the Zuider Zee by the Y. Originally it embraced funr small lakes, which, in consequence of several irruptions of the sea, eventually merged into one sheet of water, covering an area of about 45,230 acres. The depth did not exceed 15 feet; the floor of the lake was largely composed of unid and clay, from which the Dutch prepared 'klinkers,' bricks used for purposes of paving. The lake frequently rose during storms to an alarming height, necessitating a large annual outlay in keeping the dams and sluices in repair. In consequence of the damage done to Amsterdam and Leyden by two successive overflows of the lake in 1836, the government serionsly addressed itself to the task of draining it (1839-52). This undertaking was effected by digging all round the lake a large canal, into which its waters were pumped by three gigantic engines. By these means the waters were drained off to the Y and Zuider Zee. The enterprise cost £1,080,000, but the sale of the lands reduced this outlay by £780,000. The population increased from 7000 in 1860 to 15,134 in 1889.

Habakkuk (Heb., 'embrace'), one of the twelve minor prophets of the Old Testament. His personal history is unknown. In his book he appears as a prophet of Judah, announcing the divine chastisement which is to come upon his nation at the hands of the Chaldean Nebuchadnezzar. He was the first of the prophets who saw in the great victory of Carchemish (Circesinun), in the fourth year of Jehoiakin, the fall of the Egyptian supremacy before the young Babylonian king. His period is thus fixed in the last decade of the 7th century B.C. Both as a poem and as a prophecy his book holds a very high rank among the Old Testament scriptures. His aim was to inspire his nation with trust in Him who is the God of Israel from everlasting, his 'Holy One' (i. 12). After asking God why he had so long suffered his prophet to cry in vain for deliverance from the sight of iniquity and grievance (i. 2-4), he gives a vivid description of the Chaldeans (i. 5 ct seqq.). Then he betakes himself in spirit to his watchtower (chap. ii.), and sees that this violent nation shall at last become the scorn of the nations it has spoiled, its idols will be of no avail: 'Jehovah is in his holy temple; let all the earth keep silence before him' (ii. 20). From this prospect he rises

to the prophetic height of the third chapter, which is a majestic bymn describing in the most striking inages the appearance of the Ahnighty for judgment, and ending (16-19) with the impression produced by this prophecy on himself, and a beautiful expression of his confidence in God, whatever may befall. The keynote of the whole prophecy is the sentence in ii. 4: 'the just shall live by his faith,' quoted by St Panl in Rom. i. 17, and Gal. iii. 11. The best commentaries on Habakkuk are those of Delitzsch (1843), Hitzig (3d ed. 1863; 4th ed. by Steiner, 1881), Ewald (1867; Eng. trans. in vol. iii. of his *Prophets*, 1878), Kleinert (1869), and Keil (1873).

Habberton, John, anthor, was born in Brooklyn, New York, 24th February 1842, served through the civil war, and was for some years a clerk, afterwards turning to journalism. His best-known book is Helen's Babies (1876), which attained an astonishing popularity both in America and in Europe. He has published also The Barton Experiment (1877), Other People's Children (1877), The Worst Boy in Town (1880), Who was Paul Grayson? (1881), a humorous Life of Washington (1883), One Tramp (1884), Brueton's Bayou (1886), and other works.

Habeas Corpus, in English law, is the formal commencement of several writs, issued by the superior courts, which direct a person who has another in custody to produce the body of the prisoner. Such writs are or have been used in practice for various purposes. Thus, the habeas corpus ad respondendum was used to bring up a prisoner to serve him with a writ; and the habeas corpus ad testificandum may still be used to bring up a prisoner to give evidence. But the best-known and by far the most important form of the writ is the habcas corpus ad subjictendum, by which the person detaining another in custody is ordered to bring up his prisoner, and to state the reasons for such detention, that the court may judge of their sufficiency. This 'prerogative writ' is one of the chief securities of English liberty. By the law of England, as embodied in the Great Charter, no freeman could be imprisoned except for a crime of which he was found guilty by his peers, or for a civil debt. The effect of this rule of law was that the executive government had no right to imprison an individual on suspicion, or for an indefinite period. Arrest and imprisonment writ is the habeas corpus ad subjiciendum, by right to imprison an individual on suspicion, or for an indefinite period. Arrest and imprisonment could only be justified by making a definite charge against the prisoner, and by putting him on his trial before a jury without unreasonable delay. A person illegally imprisoned could demand of the Court of King's Bench a writ of habeas corpus; and on return being made to the writ, the court might discharge the party, or admit him to bail, or send him back to await his trial, according to the nature of the case. This was the rule of law; the nature of the case. This was the rule of law; but it need hardly be said that in despotic times the courts could not be relied on to protect the subject against illegal imprisonment. In the reign of Charles I. the judges refused to issue a hubeus corpus in vacation time. They also assumed a discretionary power to grant or refuse the writ; by sending prisoners beyond the sea, to Jersey and other places. These abuses led in 1679 to the enactment of the statute 31 Car. II. chap. 2, commonly known as the Habeas Corpus Act. This act and the government sometimes evaded the law did not, as is often supposed, introduce any new form of process; but it seemed to the subject the ancient constitutional remedy of which the weak-ness of the judges and the had faith of the govern-ment had deprived him. The writ may be sued out by motion in court, or by an application to the Lord Chancellor or one of the judges, supported

by affidavits showing that the person on whose behalf the motion or application is made is illegally The chief rules of the act are as follows. When a person is committed to prison the judge to whom application is made must, nuless there has been great delay in making the application, grant the writ of habeas corpus. The writ must be obeyed, more or less promptly according to the distance; but in no case must the delay exceed twenty days. Any officer who refuses the prisoner a copy of the warrant of commitment, or who shifts the prisoner to another enstedy without authority, forfeits £100, and for the second affence £200, and is disabled to hold office. No person once delivered by habous corpus may be recommitted for the same offence under a penalty of £500. A person committed for treason or felony may insist on being tried in the next term or session, or admitted to bail, unless the erown witnesses cannot be ready: if not tried in the second term or session he must be discharged. Any judge who denies the wit forfeits £500. This is now the only case in which a private person may take proceedings against a judge in respect of an act done in his judicial

capacity.
The Habeas Corpus Act extends only to the cases of persons imprisoned on criminal charges; but in 1816 its provisions were extended to other cases by the 56 Geo. III. chap. 100. The result of these enactments is that in all cases where any person, whether man, woman, or child, is deprived of liberty, some friend may apply for a habcas of liberty, some friend may apply for a habras corpus directed to the officer or private person having custody of the prisoner. Refirsal to make any return to the writ will of course be dealt with as contempt of court. If the party is detained by lawful authority (e.g. in the cuse of a child in the care of its parents, or a dangerous limatic privately kept under restraint by his friends) the facts must be stated in the return. If the alleged authority is of a formul character (e.g. a warrant of counties the of huncely it must. of commitment, or a certificate of lunacy) it must be produced, and the court will judge of its legal sufficiency. A writ of habeas corpus inns in any county palatine or privileged place, in the Channel Islands, and the Isle of Man. In the case of Anderson, a slave who in 1853 had escaped to Canada after killing a Missouri planter, it was held that the writ might be applied for by a person confined in a colony; but an act passed in 1862 provides that the writ shall not run in any colony where there is a court having authority to grant a habcas corpus.

The law of habeas corputs does not extend to Scotland; but the subject is protected by the Wrongons Imprisonment Act, 1701, chap. 6, which is often called the Scotch Habeas Corpus Act. In Ireland there was no Habeas Corpus Act until 1783; and the provisions of the law then passed the government with exceptional powers. The protection of habras corpus is secured to American citizens by the constitution of the United States, and by the constitution of most of the states. state courts do not discharge persons imprisoned by order of federal courts; nor will the federal courts interfere with persons imprisoned under state process.

In times of rebellion or disturbance the government may find it necessary to arrest dangerous persons, and to detain them in custody without bringing them to trial. In such cases the govern-ment may either break the law and apply to parliament for an Act of Indemnity, or it may invite parliament to suspend the Habeas Corpus Act for a time. In 1881, for example, the Irish government was empowered to detain without trial all persons reasonably suspected of complicity in

treason and erime. In the United States, Merryman's ease, in 1867, gave rise to a keen discussion, some eminent lawyers maintaining that the president, of his own authority, could suspend the law of habeas corpus, others contending that the power of suspension could only be exercised by congress. For the history and law of Hubeas Corpus, see Blackstone's Commentaries, Hallam's Constitutional History, Story's Commentaries on the Constitution of the United States, &c.

Habergeon. See HAUBERK, ARMOUR.

Habington, WILLIAM, poet, was bom at Hendlip in Worcestershire, November 4, 1605. His family was Catholic; his nucle was executed, and his father lay six years in the Tower, for complicity in Babington's plot. He was educated at St Omer, but declined to become a Jesnit, and was next sent to Paris. He manied Lney Herbert, daughter of the first Lord Powis, and has immortalised her in his Castara, a collection of lyrical pooms, some of rare beauty and sweetness, and stamped throughout with a purity then unusual. the was fast published in quarto in 1634. His father died in 1647, and he himself, says Wood, 'who did then run with the times and was not nuknown to Oliver the usurper, died on the 30th of November 1654.' Other works of Habington were The Historic of Edward the Fourth (1640); The Queene of Aragon, a Tragi-concede (1640); and Observations upon Historic (1641).

Habit. See Heredity, Instinct, Replex ction, Variation, Association of Ideas, ACTION, VARIATION CAUSALITY, ETHICS.

Habit and Repute, a phrase used in Scotch law to denote something so notorious that it affords strong and generally conclusive evidence of the facts to which it refers. The best-known example of this is where a man and woman colabit as hisband and wife, and are reputed by the neighbous to be married, in which case the law of Scotland accepts the colmbitation and the proof by public opinion as evidence that a marriage has been contracted by the parties by the interchange of consent. In England no such doctrine prevails, and the marriage would have to be proved in the usual way, if called in question, by a suit which directly raises such question, though the parties had all their lives lived together as man and wife.—There is also in Scotland an application of the doctains of habit and repute to persons when convicted of stealing; for if the individual is a habit and repute thief—i.e. a notorious thief—the repute that the accused gets his livelihood or supplements it by thieving is technically an aggravation of the offence, and may be charged and proved as such a nor is it necessary to the establishment of such a charge that the accused should have been previously convicted. In England and Scotland a somewhat similar effect is produced more circuitously, by proving that the thief has been several times previously convicted (is a 'babitnal criminal'), in which case he is generally punished by a severer

Habitual Drunkards. See Inebriates. Habsburg. See Harsburg.

Hachette, Louis, French publisher, was born at Rethel in the Ardennes, on 5th May 1800. In 1826 he established in Paris a publishing business, principally with the intention of issuing hooks calenlated to improve school teaching and elevate the general intelligence. In pursuance of his plan he has published several series of books, as the Bibliotheque populaire, Bibliotheque variée, &c., which have done most useful service in disseminative interpretational aureus the popular. ing information and amusement among the people. He also deserves to be mentioned as a friend of the

working elasses, and as the promoter of international copyright. He died 31st July 1864.

Mackee, a name for the Chipmunk (q.v.).

Häckel, Ernst. See Haeckel. Hackberry. See Neitle Tree.

Hackbut. See FIREARMS.

Hackensack, a post-village, capital of Bergen county, New Jersey, on the Hackensack River, 12 miles by rail N. of Jersey City. It has several factories. Pop. 4983.

Hackländer, FRIEDRICH WILHELM VON, a German novelist and comedy writer, was born at Burtscheid, near Aix-la-Chapelle, 1st November 1816. After one or two false starts in life, he commenced his literary eareer with Bilder aus dem Soldatenleben (1841), and three years later followed up his success with Das Soldatenleben im Frieden (9th ed. 1883). The truth and pleasant humour of these books induced Baron von Taubenheim to invite Hacklander to accompany him on his travels to the East. The literary fruits of this jonrney were Daguerreolypen, aufgenommen auf einer Reise in den Orient (2 vols. 1842), and Pilgerenter Reise in den Orient (2 vols. 1842), and Pagerzug nach Mehka (1847; 3d ed. 1881), a collection of oriental tales and legends. In 1843 he was appointed private secretary to the crown-prince of Wirtemberg, with whom he travelled in the succeeding years. In March 1849 he went to Italy, was present with Radetaky's army during the campaign in Piedmont, and afterwards published campagn in Figure 1, and afterwards published Soldatenleben im Kriege (2 vols. 1849-50). From 1859 enwards he lived for the most part in Stuttgart, partly also at Leoni on Lake Stamberg (or Würm) near Minich, and died at the latter place, 6th July 1877. The best of his longer novels are Handel und Wandel (1850; 3d ed. 1869), Engen Stillfried (1852), and Namenlose Geschichten (1851). Accurate nortraiture of natural life mostly it. Accurate portraiture of actual life, mostly its external aspects, and a genial humour are the most outstanding characteristics of these works. best comedies are the Geheimer Agent (1850), which has been performed on all the stages of Germany, and translated into several European languages, and Maynetische Curen (1851). Along with Zoller he started the illustrated unagazine Ueber Land und Meer. A collected edition of his works was published at Stuttgart in 60 vols. 1855-74. See his posthumous Roman meines Lebens (2 vols. 1878).

Hackmatack. See LARCH.

Hackney, a parish of Middlesex, now forming a suburb of London, and 3 miles NNE of St Paul's. It was at one time a favourite submiban residence of the London citizens, but, the current of fashion having for many years been setting to the west, Hackney no longer holds the rank it formerly did. In its earlier and fashionalde days it is by some said to have given its name to hackney-coaches. See Cabs.

Haco V., surnamed the Old, king of Norway from 1223 to 1263. During his reign Greenland and Iceland were added to the Norwegian crown. Haco died in the Orkneys on his way home from Scotland, where he had fought the battle of Largs (q.v.) against Alexander III. See Norway.

Haddington, the county town of Haddington-shire, lies at the southern hase of the Garleton Hills, on the Tyne, 17 miles E. of Edinhurch. Its Abbey Church, the Lucerna Laudonar or 'Lamp of Lothian,' is a cruciform Decorated red sandstone pile, with a central tower 90 feet high, and ruinous all but the nave, which serves as the parish church. Then there are the county buildings (1833), the large corn exchange (1854), the town-hall (1748–1831), the county lunatic asylum (1866), and a school, the Knox Memorial Institute (1880). Haddington's worthies have been Knox, John Brown

and Samuel bis grandson, Samuel Smiles, and Jane Welsh Carlyle, whilst its chief memories have been penils by flood and fire, and the great siege of the English by the Scotch in 1549. An ancient royal burgh, it united till 1885 with North Berwick, Dinbar, Jedlungh, and Lauder to return one member to parliament. Pop. (1831) 3857; (1881) 4043. See works by James Miller (1844) and John Martine (1883).

Haddingtonshire, or East Lothian, a maritime county of Scotland, washed on the north for 32 miles by the German Ocean and the Firth of Forth. Its utmost length is 26 miles, its utmost breadth 19, and its area 280 sq. m. In the south are the Lammermuir Hills, enhanating in Lammer Law (1733 feet); whilst isolated heights are North Berwick Law (612), Traprain or Dumpender Law (724), and the Garleton Hills (594), on which stands a conspicuous column, erected in 1824 to the fourth Earl of Hopetonn. The Tyne, flowing 16 miles north-eastward through the county, is its only considerable stream. The rocks are variously Silurian, sand-tone, volcanic, and carboniferons, and yield coal, iron, and lime-tone, the coal having been mined near Tranent since the 13th century. The annual rainfall is 25 inches, and the mean temperature 46° F. Thanks to a long series of skilled agriculturists, from John Cockburn of Ormiston to Mr Hope of Fenton Barns and onwards, Haddingtonshire has for two hundred years enjoyed high agricultural fame, having been the first Scottish county to adopt the sowing of turnips in drills (1734), the thrashing-machine (1787), and the steam-plough (1862). About 64 per cent. of the entire area is in cultivation, and more than one-seventeenth is under wood. The county returns one member to parliament. Its towns are Haddington, Dunbar, North Berwick, Prestonpans, Tranent, and East Linton; and under these and the Bass Rock are noticed the chief events in its history. The antiquities include the ruined eastles of Dirleton and Tautallon. Pop. (1801) 21,986; (1841) 35,886; (1881) 38,302. See Lothian, and works by D. Croal (3d ed. 1885) and J. Small (1883).

Haddock (Gadus wglefinus), a fish of the same genus with the cod, and much rescubling it in general appearance. The number of fins is the same as in the cod, there being three dorsals and two anals. The haddock, like the cod, has a barbule at the point of the lower jaw. The haddock is brown on the back, silvery on the helly; the lateral line is black, and there is a black spot behind each of the pectorals, these spotsometimes extending so as to meet on the back. An ancient legend ascribes these spots to the finger and thumb of St Peter, and states the haddock to be the fish from the month of which he took the tribute-money, 'the inventors of the legend never adverting to the improbability of a marine fish living in the fresh-water lake of Gennesaret.' The haddock, indeed, is not found even in the Mediterranean. Nor does it enter the Baltic, although plentiful in the northern parts of the Atlantic Ocean, both on the European and the American coasts. On the British coasts it is abundant almost everywhere, appearing in great shoals at particular seasons, but in size and quality the haddocks taken at one part of the coast differ much from those of another. Those of the east coast, and particularly those caught in deep water, are in great esteem, and those of Dublin Bay are remarkable for their large size. A haddock of 16 lb. has been taken in Dublin Bay. Generally, however, this fish is much smaller. It is taken both by trawl-nets and lines. The namal bait for the long lines used to eatch this fish on the east coast of Britain is mussel. The haddock, when

really of good quality, is perhaps the finest of all the Gadidæ; and the numbers taken on some parts of the British coasts are very great, rendering it, from an economical point of view, a very important lish. It does not 'take salt' so well as the cod, but is often enred by drying and smeking. In March and April the haddock is out of season; in October, November, December, and January it is in finest condition. Smoked Finnan Haddocks are named from the lishing-village of Finnan or Findon (q.v.), in Kincardineshire.

Haddon Hall, an old English baronial mansion, the seat successively of Avenells, Vernons, and the Entland family, stands on a slope over looking the Wye in Derbyshine, 23 miles NNW. of Derby. The styles of architecture range from Norman to the 16th century. Reference is unde to it in Scott's Peveril of the Peak. See two works with illustrations by Cattermole (1846-67); S. C. Hall's Haddon Hall (Buxton, 1871); and Quarterly Review, January 1890.

Hade. See DISLOCATION, ORE, DEPOSITS.

Haden, Francis Seymour, who both by his writings and by the etching-needle has contributed to the revival of interest in etching, was born in London on 16th September 1818. He is by profession a surgeon, and was in 1857 elected a Fellow of the Royal College of Surgeons. His work in connection with etching was undertaken tentatively in 1843, and carnestly in 1858, as a relaxation from professional labours. The Etched Work of F. S. Huden centains 185 plates from his hand; others have been published in Etndes à PEan Forte (1865-66). The chief qualities of his work are vigour and breadth. Mr Haden is president of the Society of Painter Etchers, and has written Etched Work of Rembrandt (1879-80), Lectures, and About Etching (1881).

Hadersleben, or Haderslev, a town of Sieswick-Holstein, situated 32 miles N. of Flensburg, on the Hadersleben Fohrde, a narrow arm of the Little Belt. It has an inon-foundry, and machine and tolmore factories. Pop. 7635.

Hades, in Greek religion, the name applied to the kingdom of the under-world, the abade of the departed spirits or shades. Hades and Photo (q.v.) are also personal names for its king. It is the Greek word by which the Septuagint translates the Hebrew sheol, the abade of the dead, in which sense it occurs frequently in the New Testament. See Hell.

Hadith. See Mohammed, Sunnites.

Hadji. See HAJJ.

Madleigh, a quaint old market-town of Suffolk, on the Bret, 9½ miles (12½ by a branch-line) W. of Ipswich. Its chief buildings are the brick Rectory Tower (1495) and the noble parish church, with a spire 135 feet high. Formerly, from 1331, an important seat of the cloth-trade, Hadleigh was the scene of the death of the Danish king Guthmm (889), of the martyrdom of Dr Rowland Taylor (1555), and of the 'great conference' (1833) out of which grew the 'Tracts for the Times,' and at which Newman, Hurrell Fronde, Trench, and Rose, the then rector, were present. Pop. of parish (1851) 3716; (1881) 3237.

Hadley, James, an American philologist, was born at Fairfield, New York, 30th Moreh 1821, graduated at Yale in 1842, was for six years totor and assistant professor there, and was professor of Greek from 1851 until his death at New Haven, 14th November 1872. He was one of the American committee for the revision of the New Testament. Hadley published a Greek grammar and Elements of the Greek Language (1869); after his death a volume of lectures on Roman Law appeared, and a

series of *Philological and Critical Essays* (1873; ed. by Professor W. D. Whitney).

Hadley, John, an English mathematician, the inventor of Hadley's quadrant (see Sextant) and of a reflecting telescope (1723). The honour of having invented the sextant is claimed for Hadley, Godfrey, and Newton. Each seems, however, to have made his own discovery independently. Hadley described his instrument, which he called an 'octant,' to the Royal Society on 13th May 1731. He contributed several papers to the Transactions of the society from 1717 enwards. He died 15th February 1744.

Hadramant, the name commonly given to the coast-region of South Arabia from Aden to Cape Rus-al-Hadd, but by modern Arab geographers restricted to the region lying approximately between 48" and 51" E. long. It consists of a plateau, parted from a mountain-chain, the harrier of the interior desert, by a complex of valleys. Commerce, agriculture, cattle-breeding, and the chase are the chief occupations. The climate is dry but healthy. Pop. about 150,000. Nominally the people are subject to Turkey, but the social and political conditions of the district are very similar to those of the former fendulism of Emope. Chief towns, Saiun and Terim, the former the seat of a celebrated Arab seminary. See Van den Berg, Le Hadhramout (1886).

Hadrian. Publius Elius Hadrianus, Roman emperor from 117 to 138 A.D., was born at Rome in 76. Driving the reign of Trajan, who was his guardian and kinsman, he filled several high offices in the state, and in his earlier life devoted himself with such ardour to the study of Greek as to number with such ardour to the study of theek as to earn the nickname of Graveulus. He accompanied the omperor in his wars against Decebalus, where he distinguished himself by his bravery; and in 117, when Trajan set out on his return to Italy, he was left behind with the army as prefect of Syria. When the intelligence reached Authorh that Trajan had died in Cilicia on his journey home, Hadrian was proclaimed emperor by the army, August 11, 117 A.D. The state of the empire at the time was extremely critical. Insurrections had broken out in Egypt, Palestine, and Syria; Morsia in the east and Abarritania in the west were both invaded by burbarian hordes; while the Parthians had once more asserted their independence, and wen several successes over the imperial forces. Hadrian, perceiving the advantage of a peaceful policy, wisely resolved to limit the boundaries of the Roman dominion in the East, and concluded a peace with the Parthians, surrendering to them all the country beyond the Emphrates. After appearing the Roxoleni and Sarmatre, who had made an inroad into Musia, he repaired to Romo, where he had been already acknowledged by the senate, established his authority by liberality towards the people, and suppressed with great severity a patrician con-spiracy against his life. In the year 119, for the purpose of becoming acquainted with the state of the provinces, he commenced his celebrated journey, the provinces, he commenced his colourated journey, which he is said to have performed chiefly on foot, marching bareheaded 20 miles a day and sharing cheerfully the hard fare of the humblest soldier. He visited Gaul, Germany, Britain, where he built the famous wall extending from the Solway to the Tyne, Spain, Mauritania, Egypt, Asia Minor, and Greece, whence he returned to Rome after his circuit of the empire in 126 or 127 A. D., and received the title of Pater Patrice. Hadrian spent the years title of Pater Patrice. IIndrian spent the years 132 and 133 in Athens, which city he adorned with splendid and costly buildings. After once more visiting Syria and crushing a desperate Jewish revolt, he returned to Italy, and spent the last years of his life at Reme and at his splendid villa

at Tihnr. During the severe illness which carried him off, July 10, 138, at Baiæ, he was subject to violent outbursts of crnelty, to which, as well as to jealousy and pleasure, he was naturally subject. After the death of Lucius Ceionius Commodus, whom he had adopted under the name of Lucius Elius Verus, he appointed Titus Amelius (afterwards the Emperor Antonians Pius) his successor. During his reign the army was vigorously disciplined and reorganised, so that the barbarians were not likely to attribute Hadrian's conciliating and peaceful policy to fear or weakness. As a civil ruler he merits high praise for the just and comprehensive view he appears to have taken of his duties as a sovereign. Hence to him is attributed, more than to any other, the consolidation of the monarchical system of Rome. Hadrian also divided Italy into four parts under four consuls, to whom was entiusted the administration of justice. Hadrian had a passion for building: his most splendid edifices were the mausoleum called the Moles Hadriani, in Rome, the nucleus of the present castle of St Angelo, the Elian bridge leading to it, and the magnificent villa at Tibm, He likewise laid the foundation of several eities, the most important of which was Adrianopolis. He was a lover of the line arts-in Addranopous. He was a nover of the line at 1-in the history of which, as well as of jurispindence, his reign forms an important era—of poetry, philosophy, and rhetorie, all of which he attempted. He set a high value on Greek literature, and likewise on the cultus of Greece, and caused himself to be initiated into the Eleusinian mysteries. fragment of ancient literature has been more famous than the verses attributed to the dying Hadrian:

Annula vagula blandula Hospes comesque corpons, Qua nunc abibis in hoca Pallidula rigida midula, Nec ut soles dabis jocos.

Mr David Johnston, in his Translations, literal and free, of the dying Hudrian's Address to his Soul (privately printed, Bath, 1877), gives no fewer than 116 translations of all degrees of excellence.

Many of these have read into the poem a kind of Christian or Neoplatonist sphituality which is not really in it, its aim being rather to emphasise the miserable state of the soul as soon as it ceases to enjoy the friendly hospitality of the body. Lord Carnarvon, in vol. iv. (1884-85) of The National Review, gives versions of it by Byron, Prior, two by Pope, one by Dean Merivale, and another by himself. Of these, Prior's is undoubtedly the best, although the freest rendering; Byron's, the poonest; while the second of Pope's—the well-known 'Vital spark of heav'nly flame'—is not properly a translation at all.

See Merivale's History of the Romans under the Empire, vol. vii.; W. Une's Lye of the Antonines, in 'Epochs of Ancient History;' Gregorovius, Der Kaiser Hadrian (1884); and Duir, Die Reisen des Kaisers Hadrian (1881).

Hadrian's Wall. Before Agricola advanced into Scotland he planted some forts on the neck of land between the estuary of the Tyne and the Solway Firth, to protect him from attack in his rear and to seemre the bringing up of supplies. He adopted the same precaution before leaving the Lowlands of Scotland for the Highlands, placing encampments between the firths of Forth and Clyde. Afterwards walls were constructed on these two lines. On the English side of the Border we find a stone wall with a ditch on its north side. Attached to it are stationary camps, mile-eastles, and tracted to it are stationary camps, mile-eastles, and tractes for the accommodation of the soldiery who manned it. To the south of the stone wall is a series of ramparts generally called the vallum. This fortification consists of three aggers or mounds and a ditch. The military way along which the soldiery moved lies between the murns or stone wall and the vallum. The wall was not intended as a mere fence to block out the Caledoniums, but as a line of military strategy. Every station and mile-castle has a wide gateway opening northwards. This does not look as if the Romans in the time of Hadrian had given up the country north of the wall to the enemy. Besides, two Roman roads, the



Map showing the line of Hadrian's Wall.

Watling Street and the Maiden Way, run past the wall into Scotland. On these ways were stationary camps, which have yielded inscriptions and coins considerably posterior to the time of Hadrian or Severus. A controversy long existed as to the time when the lines of fortification in the north of England were constructed. One great authority, the Rev. John Horsley, anthor of the Britannia Romana (1732), maintained that the north agger of the vallum was reared by Agricola, and that it was the road by which his forts were connected, that the ditch and the other two aggers were the work of Hadrian, and that the wall was reared by Severus. Stukeley (1687–1765), however, expressed the opinion that both vallum and nurus 'were made at the same time, and by the same persons, and with the intent that the vallum should be a counterguard to the other, the whole included space being military ground.' Since Horsley's day inscriptions in honour of Hadrian have been found in four of the mile-castles in the central

part of the line, and, as the milc-eastles are an ex-ential part of the wall, Hadrian is now generally believed to have been the builder of the whole structure. Severus, however, repaired it before he advanced into Scotland, where in three years he lost 50,000 men, and came back to York to die. Agricola came to Britain in 78 A.D. Hadrian eame towards the close of 119 A.D. Severus died in 211 A.D. Towards the close of the 4th century Theodosius, for a brief period, reasserted the Roman dominion over the district between the walls of Antoninus (q.v.) and Hadrian, which, in honour of the Emperor Valens, obtained the name of Valentia. But this newly-established province was soon lost, and it was not long before the Romans finally abandoned Britain. Considerable traces of Hadrian's Wall yet remain in Northumberland. In two places the wall stands 9 feet high. See John Collingwood Brnee, The Roman Wall (1851; 3d ed. 1866), and Handbook to the Roman Wall (1863; 3d ed. 1885).

Hadrosaurus, the name given to a very large Dinosaurian (q.v.) of the Cretaceous epoch, whose remains have been found abundantly in New Jersey.

Haeckel, Ennst Henrich, a distinguished German naturalist, horn 16th February 1834, at Potsdam. He studied natural science and medicine at Würzburg, Berlin, and Vienna under Muller, Virchow, and Källiker; and soon became distinguished for his enthusiasm and originality in zoological studies. After working for a while at Naples and Messina, he became a privat-docent in the university of Jena in 1861, a professor ectraordinarius in 1862, and an ordinary professor of Zoology in 1865. In this position, in spite of other inducements, Haeckel has remained working indefinigably in his zoological institute, interrupted only by visits to the North Sea shores and the Mediterranean, or by more extended travels—e.g. ta Madeira, the Canaries, Morocco, south Spain, Arabia, India, and Ceylon.

The most important of his numerous systematic works are the following: a monagraph on the radiolarians (Die Radiolarien, 1862), with a superb atlas of 35 plates; the classic work on calcareous sponges (Die Kalksrhwamme, 1872), important both in relation to these animals and in its practical illustration of general problems such as the nature of species; a yet larger work on jelly-fishes (Nystem der Medusen, 1879), with an atlas of 40 plates, which like all Hacekel's work display inhorn artistic talent nusurpassed among naturalists; several smaller works, such as that on the development and division of labour of the Siphonophora (1869), or that on the Monera (1870), in which he ranks under the title Protista the lowest forms of life which have not taken a decisive step towards plants or animals, or that on Arabian Corals (1876); and finally his monumental contributions to the Challenger Reports—on Deep-sea Meduse (1882), with 32 plates; on Siphonophora (1888), and especially on Radiolaria (1887), in three volumes,

with 140 plates and 3500 new species.

With the above gigantic descriptive work Haeckel has combined two rarer accomplishments, successful generalisation and popular exposition. His Generalle Morphologic (2 vols. 1866), in its reasoned orderliness and clear generalisations, ranks beside Spencer's Principles of Biology; it is not only one of the very few works of moment an general morphology, but is greater than its name singests, really including the gist of a series of treatises—e.g. on the commonly avaided subject of organic stereometry—the science of shape or promorphology, on the much-debated problem of individuality, on the various modes of reproduction, on heredity, and on the pedigrees of animals. Besides being one of the first to sketch the genealogical tree (Stammbaum) of animals, Haeckel gave precise and liminous expression to the general fact that the life-history of the individual is a more or less accurate recapitulation of its historic evolution. As a special application of this 'fundamental biogenetic law' his Gastrea-theory (elsewhere stated) is of paramount importance (see EMBRYOLOGY). Among other general works may he noted his Perigenesis of the Plustidules (1876), an ingenious contribution to the theory of Heredity (q.v.), and his speculations on the origin and development of animal tissues (1884).

Apart from detailed zoological work, Haeckel has devoted his life to applying the doctrine of evolution and to making it current coin. Owing much of his motive to Darwin, he stood for a time almost alone in Germany in his championship of a theory not then popular. Before the publication of Darwin's Descent of Man Haeckel was the only naturalist who had clearly recognised the import of sexual

selection, and of his Natural History of Creation Darwin says, 'If this work had appeared before my essay had been written, I should probably never have completed it.' His most important expository works are the above-mentioned Naturileibe Schopfungsgeschichte (1st ed. 1868; 8th ed. 1889), which has been translated into twelve languages; 'The Evolution of Man' (Anthropogenie, 1874; 3d ed. 1877); and lectures on development and evolution, Gesammelte populare Vortrage and dem Gebiete der Entwickelungslehre (1878-79). Hacekel's popular works are very brilliantly written, but they are not always so careful in statement as Darwin's classics, and offend many by their remerseless consistency, and by their impatience with theological dogma and teleological interpretation. He has always been set against compromise, defending the freedom of science in a funnous pamphlet (Freie Wissenschaft und Freie Lehre) written in answer to Virchow. Philosophically Haeckel is described as a monist, and practically, though by no means necessarily, the tendency of his popular writing is materialistic.

Like all other naturalists, he has made a few mistakes; there are hints both in some of his drawings and in some of his arguments of the dangers of artistic and speculative imagination; and it may be doubted whether his early championship of evolution and Darwinism has not resulted in a taint of dogmatism in what is sometimes called 'Haeckelismus.' On the other hand, the thoroughness of his systematic labours, the excellence of his draughtsmunship, the clear generalisations of his Generelle Morphologie, the geniality of his teaching, and perhaps above all the conrage, lucidity, and eloquence of his popular expository work on evolution have raised Haeckel to a pre-eminent position among modern naturalists. See Biology, Darwinian Theory, Embryology, Evolution, Heredity, Zoology.

Hæmatemesis (Gr. haima, 'blood,' and emesis, 'vomiting'), the ejection of blood from the stomach by vomiting. Its most common eauses are gastrie nleer; congestion of the stomach or the neighbouring portions of the alimentary canal (see STOMACH, DISEASES OF); and certain conditions of the blood, as in yellow fever, purpnya, and sometimes in typhus. See BLEEDING.

Harmatite (Gr. haima, 'blood'), a mineral consisting chiefly of peroxide of iron, is a valuable iron ore. There are two principal varieties, Red Harmatite and Brawn Harmatite. See Iron.

Hamatite and Brawn Hamatite. See Inon.

Hamatocele (Gr. haima, 'blood,' and kölö, 'tmnour'), a tmnour containing blood; opposed to Hydrocele (q.v.).

Harmatoxylin. See Logwood.

Hæmatozoa (Gr. haima, 'blood,' and zoon, 'an animal'), parasites occurring in the blood. (a) Some Gregarines (q.v.) live in the blood-corpuscles of frogs, reptiles, and birds. (b) A few Nematodes occur in the vascular system—e.g. Filaria immitis, in the heart of the dog; Strongylus armatus, causing abdominal aneurism, in horse and ass; Filaria sanquinis hominis, which in Anstralia, China, India, Egypt, and Brazil occurs in man, the sexual female in the lymph glands causing Elephantiasis (q.v.), &c., the embyos circulating in the blood and causing hæmaturia, &c., while the larval asexual stages occur within a mosquito. (c) A very important blood parasite among Trematodes is Bilharia (q.v.), occurring in Africa, in the blood-vessels of the bladder, mesentery, and portal system of man. See Bilharzia, Gregarins, Nematode, Parasitism; also Leuckart's Parasites of Man, trans, by W. E. Hoyle (Edin. 1886).

Harmaturia (Gr. haima, 'blood,' and ouron, 'nrine'), the discharge of blood with the urine, usually from disease of the kidneys or bladder. It

is rather a symptom than a disease, and, although always of some gravity, it is not very often directly Where it is necessary to treat the symptom itself complete rest is very important; the lowels may require to be freely moved; and styptics, such as ergot or perchloride of iron, may be taken by the month, the former in thirty-drop doses of the liquid extract, the latter in twenty-drop doses of the tincture, every two or three hours.

Hamodoracea, an order of manacotyledons, consisting of herbaccons plants with fibrous roots and sword-shaped leaves; differing from Iridaeea in habit, and in having the stamens six in number, or, if only three, opposite to the petals. There are about fifty known species, chiefly natives of America, South Africa, and Australia. Some of them have beautiful liliaceous flowers. A red There are colour exists in the roots of some; hence the name Blood root has been given to them (see SANGUIN-ARIA). In Tree-lilies. In this order are ranked the Vellozias or

Hæmoglobin. See Blood.

Hamophilia, or the hamorrhagic dialhesis, is the name applied to a constitutional peculiarity which manifests itself in a tendency to excessive bleeding when any blood-vessel is injured. In those who suffer from it (bleeders) a slight lurnise may cause extensive extravasation of blood; a small cut or the extraction of a tooth may lead to dangerous or even fatal humorrhage. It is not known whether it is to the blood or the blood-vessels of those effected that the foulty excess. vessels of those affected that the faulty arrest of bleeding is due. The condition is strongly heredi-tary; and, though it raiely affects women, is often transmitted in the female line. No cure is known

Haemoptysis (Gr. ptysis, 'spitting'), expectoration of blood, a symptom of disease of the lnng-or heart, in all cases of great importance, and requiring immediate attention, but apt to be viewed popularly with a somewhat exaggerated alarm. It is seldom directly fatal, but it is often the first announcement of phthisis, and it is a matter of common prudence to seek medical advice on the appearance of even the slightest tinge of blood in the expectoration. Blood which comes from the lungs is *congled* up, and it is generally bright and frothy. Blood from the stomach is comited, and has the appearance of coffee grounds or have some from the action of the gastrie juice on it. See

Hæmorrhage. See Bleeding; and for hæmorrhagie diathesis, see Dlathesis, Hæmo-PHILIA.

Hæmorrhoids. See Piles.

Hæmus, Mount. See Balkan.

Haff, a word derived from the Danish hav, meaning 'sea,' and used to designate three lagoons along the Prussian coast of the Baltic viz. Stettiner or Pommersches Half, Frisches Half, and Kurisches Half. Half fishing or haaf fishing is a term used by the Shetlanders to signify deepsea fishing.

Hafiz, the poetical name of Shems ed-Din (i.e. Sun of the Faith) Muhammed, the greatest of Persian lyrical poets, was horn at Shiraz, where Persian lyrical poets, was horn at Shiraz, where he passed all his life and died, according to the inscription on his tomb, 791 A.H. (1388 A.D.), though the year of his death is also given by different authors as 792 and 794 A.H. The date of his birth is not known. His takhallus Háfiz signifies one who is learned in the Koran and the Hadiths, or sayings ascribed to Mohammed. Little is recorded of his life, which, indeed, seems to have been uneventful. It is probable that he was married, but nothing is known regarding his

domestic life. It would appear, from an ancodote related by Ferishtah, that Háfiz once intended making a long and distant journey, notwithstanding his stay-at-home proclivities. The sultan Mahmud Shah Bahmani, who tuled in the Deccan, invited the poet to his court, and accompanied his flattering invitation with a sum of money amply sufficient to defray his expenses. Háfiz had proceeded as far as Lár, on the direct route from Shiráz to Ormuz, a port on the Persian Gulf, whence he could obtain a much shorter and easier passage by sea to the Deccan, and there he met with an old friend, who had been recently plundered by a gang of robbets, and generously gave him a share of his money. A party of merchants conveyed him to Ormuz, where he embarked in a vessel bound for the Deccan. But before the anchor was weighed be was so much terrified at a storm which suddenly arose, that he abandoned his purpose and returned to Shiraz, after despatching a letter of apology to the chief vazir, together with an ode.

According to a curious legend, Háfiz obtained his poetical faculty from the mythical saint, or prophet, El-Khizar (so called from his green robe, the emblem of perennial youth), who appeared to him, after he had passed several nights in watching for the coming of that tutelary friend of the Faithful, and who hestowed on him a draught of the Water of Life, thus inspiring him with the gift of song. From the channing sweetness of his poetry, Haliz was fondly styled by his admiring contemporaries Chagarlab, soyled by his admiring contemporaries Chagartas, or Sugar-lip. His glazals are, externally, all on sensions subjects—wine, flowers, leantiful damsels, &c., and hence he is often termed by Europeans the Anacreon of Persia; but, while the common people, who have most of his verses by heart and constantly who have most of his verses by heart and constantly repeat them, regard them simply as love songs, they yet possess an esoterie signification to the initiated, the objects of the physical world being employed to denote those which are visible only to the inward sight. That is to say, Háfiz, in common with nearly all the greater poets of Persia, was of the sect of Saff philosophers, the mystics of Islam, who are altogether free from Mohammedan fanaticism, and 'elaim to be in so intimate a communion with the Deity, through devotion and the calling with the Deity, through devotion and the cultiva-tion of their higher and nobler feelings, that they ean afford to rise superior to the petty details of dogma and superstition.' From the mystical element in his poems, Háfiz is also called *Lishan el-Ghayd* (the Voice of Mystery). But, apart from any esoterie signification, it has been well remarked that to ignore the fact that natural feelings and sentiments, the contemplation of natural heanty and the enjoyment of human intellectual and and the enjoyment of human, intellectual, and corporeal pleasures, suggested the various expressions of admiration, love, or wit which these poems contain, would be contrary to the dietates of common sense. In short, the key to the interpretation of the songs of Háliz is to be sought in a combination of materialism and suffism.

Sir Gore Onseley has remarked that the style of Hafiz 'is elear, maffected, and harmonions, displaying at the same time great learning, matured seience, and intimate knowledge of the hidden as well as the apparent nature of things; but, ahove all, a fascination of expression unequalled by any other [? Persian lyrical] poet. The name of Háfiz is a household word throughout Persia, and his songs are cited in every social assembly, so that he who can most frequently quote from Hafiz a passage appropriate to the subject of conversation is held in the highest esteem and admination. Indeed such reputation did his ghazals aequire that his Diván, or eollection, was resorted to in order to gather from it faticas, or decrees of fate and judicial decisions, in like manner as the Sortes Virgiliana were practised in Europe during medieval times,

If we may credit popular tradition, at the death of Háfiz the 'rigidly orthodox' objected to the interment of his corpse with the enstomary ceremonies, because of the loose tone of many of his odes, and his alleged scepticism, if not rank infidelity. But some of his friends procured an appeal to the poet's Dirán, which opened at a passage that set all doubts as to his orthodoxy at rest :

Turn not away from the bier of Háfiz, For, though immersed in sin, he may yet be admitted into Paradise.

It is generally believed that Háfiz lived to a good old age, although the date of his hirth is not recorded. His tomb, which is situated some two miles north-east of Shiráz, has been most magnificently adorned by princes and wealthy vazirs, and is visited by numerous pilgrims and others from all parts of Persia.

ns visited by numerous pilgrims and others from all parts of Persia.

The odes of Hafiz were first collected by Kasim Anvari, after the poet's doath. Many editions of the Persian text have been printed, among which the most important are the following: by Aba Safih Khan Ispahani at Calcutta (1791); by G. Jervis and othors at Bombay (1828); an edition printed at Cawmpore (1831), and one at Bulak (1834), and again in 1840. A valuable edition of the text by Brockhaus, in 3 vols., was published at Leipzig (1854-61). Von Rosenzweig-Schwannau nublished at Vionoa a German translation of the greater portion of the poems (3 vols. 1858-64). The earliest rendering of a selection of the ghazals of Hafiz was published at Vienna in 1771, in Latin by Reviezki, and from it Richardson ohichy translated his Specimen of Persian Poetry, or the Odes of Hafi: (1802). There are other English renderings of some of the odes by Nott (1787), Hindley (1800), Rousseau (1801), Sir William Chseley (1797-98), Bioknell (1875), Love (1877), and S. I. [Robinson] (1875). No popular or complete translation of the Diván-i Hafiz has yet appeared in any European language, though in 1881 Professor Palmer coateapplated an English metrical translation of the entire Diván. There are also German versions of some of the poems by Von Hammer (1813), Danmer (1846), and Nesselmann (1805).

Hag, one of the vernacular names for the Mycine glutinosa L., one of the Cyclostomata or Roundmouths, allied to the lamprey. It is common off the coasts of the north of England, Scotland, and Norway, and of the North Atlantic generally, living in muddy ground at a depth of 40 to 345 fathoms. The mouth is a hollow suctorial disc, furnished with a sixely coath class and two rounds. single tooth above and two rows of strong, pointed, horny teeth below. There is a single mesal aperture above the mouth, which communicates with the pharynx. Round the nostril and mouth are four pairs of short barbules or tentacles. The body is



eel-shaped, with no lateral fins, but a slight median fin round the tail. There are no bones; the back-bone is represented by a persistent notochord with a cartilaginous sheath; the skull and mouth-skeleton are also cartilaginous. There are six gillby as many short tubes with the gullet, and ex-ternally giving off six longer tubes which unite and of the body at some distance from the head. No

are no genital ducts. The eggs are of very large size, and when expelled from the ovary are conand contained in a horny egg-membrane; their shape is an elongated ellipsoid, at each end of which are a number of line knobbed processes of the horny case, by which the eggs become entangled together. In the young state the animals are hermaphrodite, and contain immature eggs and ripe milt; when older they produce eggs only. The fish is about 15 inches in length when adult, and of a livid red colour. There are no scales. The Myxine, when not feeding, lies buried in the mud, with only the single nostril protruded, and a respiratory entreaction of water passes through this nostril to the gill-panches, escaping again by the branchial aperture. These creatures are often caught in very large buddock-lines (long lines). They numbers on haddock-lines (long lines). They gorge the bait (mussels) down into their stomachs. They also attack fish (cod, haddock) hooked on the lines, and devour all the flosh, leaving the skin. and skeleton. They probably attack living fish (Gadidae) in the same way, but evidence on this point does not seem very certain. Three species are known—the North Atlantic one mentioned, another from Japan, and another from Magellan Strait. Bdellostoma, which is closely allied, has six or more separate external branchial openings on each side, and is larger. Two species are known; one is common at the Cape.—Dr Nansen of Bergen bas recently described the lunglish as a hermaphrodite in a transition stage, for according to his researches the animal is a made until it attains a certain size, and thereafter a female, or in some cases a hermaphrodite.

Hagar. See ABRAHAM.

Hagberry. See Bird-Cherry.

Hagbut. See FIREARMS.

Hagedorn, FRIEDRICH VON, poet, was born 23d April 1708, at Hamburg, studied at Jena, and in 1733 became secretary to an old trading company at Hamburg called the 'English Court.' He died 28th October 1754. His poetry consists mainly of light satire, narrative, and 'society' verses. Since 1756 there have been many collected editions of his poems (as in 1825, 5 vols.). See works by Schuster 1883) and Eigenbrodt (1884),

Hagen, an industrial town of Prussia, in the Ruhr coal district of Westphulia, 12 miles NE, of Elberfeld-Barmen. It carries on a great deal of puddling and iron-founding, and has manufactures of iron, steel, and tin goods, cotton, cloth, leather, paper, heer, and tobacco. Pop. (1875) 24,290; paper, heer, (1885) 29,611.

Hagenan, a town of Alsaco-Lorraine, situated in the Hagevan forest, on the Moder, 21 miles by rail N. by E. of Strasburg, manufactures porcebin stoves, and has cotton and woollen spinning. The chief trade is in hops and wine. The Romanesque church of St George dutes from the 12th century, and the Gothic church of Nicholas from the 13th Having been invested with town rights by Frederick Barbarossa in 1164, it was made a free imperial city in 1257. By the treaty of Westphalia (1648) it was given up to France, and in 1871 finally returned to Germany. Pop. (1875) 11,726; (1885) 13,460,

Hagenbach, Karl Rudolf, theologium, was born 4th March 1801, at Basel. White at the universities of Bonn and Berlin, where he studied theology, he was principally influenced by Schleiermacher and Nennder; and on his return to Basel he received a fresh impulse from his intercourse with De Wette. From 1824 he occupied a chair eyes externally; mere rudiments internally. The intestine is straight. On each side of the ventral median line are a series of cutaneous glands which secrete large quantities of gelatinous slime. There this latter he wrote and taught as an adherent of the 'mediation' school of German theology. His numerous books on church history were issued as one uniform work, Kirchengeschichte von der ältesten Zeit bis zum 19 Jahrhundert (7 vols. 1868-72; 2d ed. 1885 sq.). Besides this he also wrote Lehrhuch der Dogmengeschichte (2 vols. 1840; Engtrans.); Encyklopädie und Methodologie der theologischen Wissenschaften, one of the most useful manuals for the student of German theology, which in 1884 reached an 11th edition (by Kantsch); nine vols. of Sermons; biographies of Ecolampadius and Myconins (1859); a memorial of De Wette (1850); Religionsinterricht an höheren Gymnasien (6th ed. 1881); Die theologische Schule Busels (1860); and also two small volumes of poetry.

Hagerstown, capital of Washington county, Maryland, on Antietam Creek, 85 miles WNW. of Baltimore by rail. It has machine-shops, flour-mills, and manufactories of furniture and other wooden wares, fertilisers, farming implements, and eigars. Pop. 6627.

Haggada. See ExeGESIS, TALMUD.

Haggai (Heb., 'horn on a festival'), one of the minor prophets of the Old Testament. He was among those who returned from the Babylonian exile with Zerubbabel and Joshma. The building of the temple began by them had for some time been at a stand-still, and several years of scarcity had followed. In the second year of Darins (520) Haggai prophesied that the dearth was due to the divine displeasure with the settlers for adorning their own houses while the house of God remained unfinished. The personal history of Haggai beyond what is given in his book is unknown. His prophecy is entirely connected with the construction of the temple, and closes with a promise to Zeruhbabel, in whom he appears to have expected the fulfilment of the promises of the prophets regarding the ideal son of David. His style is monotonous and weak, which some have averibed to the pressure of troublous times, others to his advanced age, concluding from it, 3 that he was among those who seventy years before were carried into exile and had seen the old temple. There are commentaries by Hitzig (3d ed. 1863; 4th ed. by Steiner, 1881), Ewald (1867; in vol. v. of Eng. trans. of his Prophets, 1878), Keil (2d ed. 1873), Reinke (1868), and Van Eaton (Lectures, ed. hy Rohinson, Pittsburg, 1883).

Maggard, Henry Rider, novelist, was born of a good Norfolk family at Bradenham Hall, June 22, 1856, and was educated at Ipswich grammar-school. He went out to Natal in 1875 as secretary to Sir Henry Bulwer, and next year accompanied Sir Theophilus Shepstone to the Transvaal, where he served until 1879, when he returned to England to marry and settle down to a literary life. His first book, Cetevayo and his White Neighbours (1882), pleased the Cape politicians, but attracted no attention clsewhere. It was in a new kind of fiction that he was to make his successes. However, his Daum (1884) and The Witch's Head (1885) were only successful after the immediate, extraordinary, and not undeserved popularity of King Solomon's Mines (1886). This was too quickly followed by She (1887), Jess (1887), Allan Quatermain (1887), Maivas's Revenge (1888), Mr Mecson's Will (1888), Cleopatra (1889), and Allan's Wife (1890). Haggard has fertile invention, vigour, and novelty enough, but the rare faculty of making things seem true has been denied him; while his style is crude and lacking in distinction, his grasp of character feehle, and his most ambilious situations violent rather than strong. His fights indeed are powerful but not Homeric, and reek with needless blood and arti-

ficial gruesomeness; his pages are bright with vivid but somewhat garish African colours. His chief merit is his readableness; his greatest praise his phenomenal success; for with all his gifts he is still lunt little of the artist, and hardly to be taken seriously as a novelist.

Haggis, a Scotch dish, called by Burns the 'great chieftain o' the puddin' race,' is usually made with the large stomach-bag of a sheep, also one of the smaller hags called the king's hood, together with the lights, the liver, and the heart. After the stomach-bags have been well cleansed, the small bag is boiled along with the pluck. A quarter of the liver is now grated down, and the heart, lights, and small bag are minced very fine along with a large onion and enough beef-snet to moisten the meal. Two small teacupfuls of oatmeal previously crisped before the fire are added, with salt, and hlack and Jamaica pepper. The whole is now stirred together, and put in the large bag, which, however, must not be much more than half filled; it is sewed up, and afterwards boiled for about three hours.

Hagiographa. See Bible. Hagiology. See Saints.

Hague, The (Dutch's Gravenhage, 'the count's hedge'), the capital of the Netherlands, and the residence of the court, stands 2 miles from the North Sea and 15 NNW. of Rotterdam. It is one of the handsomest cities in the country, being intersected by canals and shady avenues of limetrees, and having many fine public buildings and private houses. In the centre of the city is the Vijver, or Fish-pond, to the south of which stands the old castle of the counts of Holland. It consists of two courts, an outer and an inner; in this latter are the 13th century Gothic knight's hall and the chambers in which the Dutch parliament holds its sittings. On one side of the onter court (Buitenhof) stands the gate-tower, which was formerly used as a state-prison, and in which the brothers De Witt were confined till dragged thence and torn to pieces by the populace (1672). The most noteworthy amongst the public buildings and institutions of the place are the picture-gallery, with a splendid collection of works by native painters (Paul Putter's 'Bull' and Rembrandt's 'Lesson in Anatomy'); the royal library, with 200,000 volumes, 4000 MSS and collections of coins and gems; the municipal and consecue with several Dutch pictures; the Museum Meermanno-Westreenen, containing a collection of early printed books; the ethnographic museum, rich in Chinese and Japanese objects; the town-house; and the royal palaces. The church of St James is the most important ecclesiastical edifice; it dates from the 14th century, and is Gothic in style. Hague is the scat of several learned societies, as the Indian Society and the Institute for the Language, Land, and People of the Dutch Indies. Amongst the numerous statues that adom the city are those of William I. (two in number), William II., Spinoza, Bernhard of Saxe-Weimar, and the monument which commemorates the deliverance from the French. Close to the town is the beautiful pleasure park called 'The Wood,' in which stands a royal residence (1647) with the magnificent so-called 'Orange Hall.' Ryswick, where the treaty of 1697 was signed, is in the immediate vicinity. The Hague is connected by heautiful roads with Scheveningen, a fashionable bathing-place on the coast of the North Sea, which is incor-porated municipally with The Hagne. The city owes its importance mainly to the fact that it is the residence of the court and the capital of the eountry; but it has also considerable manufacturing industry, as iron-founding, copper and lead smelting, cannon-founding, printing, furniture and

carriage making, and the manufacture of gold and From 1250 a hunting-lodge of the Counts of Holland, The Hagne did not acquire importance until the 16th century: in 1527 it became the sent of the supreme court in Holland, in 1584 the place of assembly of the States of Holland and of the States-general; and it was also the residence of the stadtholders. There, too, numerons treaties have been signed and diplomatic conferences held, especially the Triple Alliance of 1668 and that of

Hahnemann, Christian Friedrich Samuel, the faunder of the homeopathic method of treatment (see HOMEOPATHY), was buin at Meissen, in Saxony, April 10, 1755. Educated at the grantin Saxony, April 10, 1755. Educated at the grant-mar-school of Meissen, he entered the university of Leipzig at the age of twenty; and it was by teaching and translating books written in English, French, Italian, Latin, Greek, Hebrew, and Arabic that he supported himself while at the university. The reputation he had made for himself as a scholar while at Meissen procuved for him a free admission to the university classes. From Leipzig he proceeded to Vienna for clinical study, where he was the favourite pupil of Von Quarin, physician to the Emperor Joseph. He then passed two years as physician and librarian to a nobleman residing in Transylvania, after which he entered and, in 1779, graduated at the university of Erlangen. During the following ten years he practised medicine and held several public appointments in Dresden and elsewhere, and then settled in a small village near Leipzig. His observation and practice had so fully that he supported himself while at the university. Lcipzig. His observation and practice had so fully convinced him, not only of the uselessness, but also of the injurious character of the prevailing methods of treatment, that he now abandoned all practice and devoted himself to chemical research and the translation into German of foreign scientific books. Of these, Cullen's Materia Medica was one. Feeling dissatisfied with his author's explanation of the modus operandi of bark in caring agne, it occurred to him to endeavour to find out what kind of action this drug had on persons in health. He accordingly took considerable doses of bark thinself, when he observed that they caused some of the symptoms he liad noted as being characteristic of ague in Transylvania. This experiment led to his interpreting the curative power of bark in this fever by the hypothesis that it 'overpowers and suppresses the intermittent fever by exciting a fever of its own of short duration. This appears in one of his notes in his translation of Cullen. Thus, as Ameke remarks, 'he started with the idea of aiding the reenperative power by a medicinal excitant acting directly on the part affected.'

His experiment also convinced him that it was

by ascertaining the effects a drug produced on healthy persons that its mode of action could most surely be ascertained. He therefore commenced a research into the records of medicine, examining the reports of cases of poisoning by individual drugs, and made experiments with other drugs upon himself and his friends. He then studied all the eases ser and his frence. He than statuted at the excess of cure by these same drigs that he could find. In these investigations he occupied six years. They proved to him that, whatever might be the truth of the theory the bark experiment had suggested, the fact was that in all instances the medicine which had cured produced a very similar condition in healthy persons to that it had relieved. This conclusion he published in an essay in *Hufeland's Journal* in 1796, having the title of 'A New Principle for ascertaining the Curative Properties of Drugs.' It is in this essay that the principle or rule of similia similibus curentur is first put forward by him, not as a theory but as a fact. His views at once met with vehement opposition. His denunciation of blood-letting and other violent modes of treatment aroused the animosity of physicians, while the very small doses of medicine which alone were needed according to his new method, provoked the apothocaries, whose trade interests were threatened. They refused to dispense his prescriptions, and he accordingly gave his medicines to his patients without any charge. For a physician to dispense his own medicine was an infringement of the rights and privileges which German law had conferred upon the apothecaries, and hence he was prosecuted in every town in which he attempted to settle from 1798 until 1810, when he returned to Leipzig. Two years afterwards he was appointed the university. The thesis he defended before the Faculty, when a candidate for this position, has been described as 'remarkable for its display of extensive reading in the ancient authors, and not only those more immediately connected with his own universal pursuits, but also in the classical writers of autiquity. At Leipzig he remained, teaching and developing his system of nuclicine to an ever-increasing band of enthusiastic disciples, and practising his profession uninfluenced by contradictions of the contradiction of the stantly recurring attacks from his professional neighbours until 1821, when a successful prosecu-tion by the apothocaries for dispensing his own medicines drove him out of Leipzig. Under the medicines drove him out of Leipzig. Under the protection of the Duke of Anhalt-Köthen he retired to Kothen, where he became a centre of attraction to numerous invalids in all parts of the world. His wife dying in 1831, in 1835 he married a French lady, who induced him to remove to Paris, where he resided and practised until his death, 2d July 1843. Halmemann is also known as one of the earliest

advocates of hygiene. His book entitled The Friend of Health, published in 1792, proves him to have been very far in advance of his time on what is now called preventive medicine. Equally so was he in the treatment of the insane. His account of his successful treatment of a certain Hanoverian statesman, who, becoming maniacal, was placed nuder his care, shows that in 1794 he had adopted those principles of non-restraint and kindness in dealing with the insane which in later years were advocated by Pinel in Paris and Conolly in England. He was also the author of several valuable papers on chemistry in Croll's Annalender Chimie—the first German periodical devoted to that science. A statue of Halmemann was erected in Leipzig in 1851. See his Life by erected in Leipzig in 1851. Albrecht (2d ed. Leip. 1875).

Hahn-Hahn, IDA, COUNTESS, anthoress of a great number of German romances dealing with aristocratic circles of life, conventional in style and often sentimental in feeling, and of numerous books of travel, was born at Tressow, in Mecklenburg-Schwerin, 22d June 1805. At the age of twenty-one she married a relative; but the mion was dissolved three years later. She thereupon travelled much in Europe and the East. In 1850, weary of her restless life, she embraced Roman Catholicism, and in 1852 entered a convent at Angers. Her later writings entered a convent at Angers. Her later writings are strongly marked by nitramontane views. The best known of her novels are Grufin Faustine, Cllrich, and Clclia Conti. Her style was cleverly satirised in Fanny Lewald's Diogena (1847). A collection of her early romances in 21 vols. appeared at Berlin in 1851. She died at Mainz, 12th January 1880.

Haidarabad. See HYDERABAD.

Haiduk, or HAJDUK (from a Hungarian word meaning 'drover,' 'cowherd'), the name given in Hungary to those who in the 16th century maintained a gnerilla warfare against the Turks, from the forests of eastern Hungary. In 1605 Stephen Bocskay, prince of Transylvania, established them in a district which he set apart for their occupation, on the left bank of the Theiss, gave them an independent constitution, and conferred upon them the privileges of hereditary nobility. This favoured position they retained until the conclusion of the war of 1849. The Haiduks are engaged almost exclusively in agriculture. In 1876 their country was incorporated in the country of Hajdu, with Debreczin as capital. The name was formerly borne by the Hungarian infantry of the line; and in the 18th century it was also applied to the retainers of the Hungarian magnates.

Maifa, a seaport of Syria, situated at the foot of Monnt Carnel, a place of some 6000 inhabitants. A little distance to the north-west a settlement of the Würtenherg 'Society of the Temple' was founded in 1869, who now form a flourishing agricultural colony of 300 persons, chiefly engaged in cultivating the vine and growing fruits. From Haifa considerable quantities of Palestinian grain are exported annually. Gordon Pasha paid visits to Haifa, and here Laurence Oliphant settled in 1882. See his Haifa, or Life in Modern Palestine (1887).

Haikh, the native name of Armenia (q.v.).

Hail, Hailstorm. The word hail in English is used to denote two phenomena of quite different origin and formation. These have in recent years been distinguished as hard hail, or true hail; and soft hail, which denotes the line, light grains, like small shot, that frequently fall in winter, much more rarely in summer, and are generally a precursor of snow. Soft hail is the gressl of the French, and the granpel of the Germans. The theory of the formation of soft hail has yet to be formulated. True hail is round, hard, compact, and formed of either clear or granular ice, the hailstones heing either clear or granular ice, the halistones being often found when broken across to be composed of alternate layers of these two states of ice. It has a well-marked dimmal period, 80 per cent. of the whole number of halistorms occurring in the six hours from 10 A.M. to 4 P.M., and only 8 per cent. in the fourteen hours from 6 P.M. to 8 A.M. The essential point to be noted in the dinral period of two hours earlier than the maximum period of hailstorms is two hours earlier than the maximum period of Thunderstorms (q.v.). The maximum period for thunderstorms is when the ascending current from the heated surface of the earth is at its greatest strength for the day; but the maximum period for hail occurs two hours before the ascending current has fully established itself, or it occurs at the time when atmospheric temperature and vapour diminish with the height at a much greater rate than the normal. In the higher latitudes the fall of hail may be regarded as restricted to the warmer months of the year; in countries where the summer is prac-tically rainless no hail falls; and where the rainfall is small and at rare intervals very few cases of hail occur.

Hail is connected with whirlwinds, more or less developed; and it is when the hailstorm is an attendant on a tornado or on a great thunderstorm that it assumes its most destructive form, carrying devastation through a narrow belt of land

usually of considerable length.

The theory of the formation of hail has been given by Ferrel in his Meteorological Researches for the Use of the Coust Pilot, part ii. p. 85. The vapour carried upwards by the vortical gyrations of the tornado is, below a certain height, condensed into cloud and rain; but above that height into snow. Now when the raindrops formed below are carried higher up into the cold snow regions by the powerful ascending currents of the tornado, and are

kept suspended there a little while, they become frozen into clear hard hail. If these hailstones he now thrown quite ontside the gyrations of the tornado, they fall to the earth as a shower of compact homogeneous hailstones of clear ice of ordinary size. But should they be caught in the descent and carried in towards the vortex by the inflowing aerial current on all sides, they are again rapidly carried aloft into the freezing region. A number of such revolutions of ascent and descent may be made before they ultimately fall to the earth. While high up in the snow region the hailstones receive a coating of snow; but while in the region lower down, where rain, yet unfrozen, is carried up, they receive a coating of solid ice. In this way alternate coatings of ice and snow are received, and the number of each sort indicates the number of ascents and descents performed before the hailstone falls to the ground. When the nucleus is compact snow, as it usually is, the hailstone has its origin high up in the snow region as a small ball of snow or soft hail.

From a well-known property of ice (regelation), the impinging hallstones are frequently frozen together not only in their course through the air, but also at the surface of the earth, giving rise occasionally to hallstones of larger dimensions. A curious instance of the fall of large hail, or rather ice-masses, occurred on one of Her Majesty's ships off the Cape in January 1860, when the stones wore the size of half-bricks, and beat several of the crew off the rigging, doing scrious injury. More than once in the summer of 1889 hallstones proved nonsually destructive on the continent of Europe; in Moravia, for instance, where many stones fell as big as a man's list, and weighing 3 lb., a number of people were killed in the fields, and many more

were injured.

A description (taken from Mém. de l'Acad. des Sciences, 1790) of a most disastrous hailstorm may be here added. This storm passed over parts of Holland and France in July 1788. It travelled simultaneously along two lines nearly parallel—the eastern one had a breadth of from half a league to five leagues, the western of from three to five leagues. The space hetween was visited only by heavy rain; its breadth varied from three to five and a half leagues. At the outer border of each there was also heavy rain, but we are not told how far it extended. The general direction of the storm was from sonth-west to north-east. The length was at least a hundred leagues, probably two hundred. It seems to have originated near the Pyrenees, and to have travelled at a mean rate of about 16½ leagues per hour towards the Baltic, where it was lost sight of. The hail only fell for about seven and a half minntes at any one place, and the heaviest hailstones weighed about 9 onnees. This storm devastated 1039 parishes in France alone, doing damage to the extent of nearly a million of English money.

Hailes, Lurd, the judicial title of Sir David Dalrymple, a well-known historical antiquary, born at Edinburgh, 28th October 1726. He was the grandson of Sir David Dalrymple, youngest and reputedly the ablest son of the first Viscount Stair. He was educated at Eton and Utrecht, whence he returned to Scotland in 1746, to be called to the Scottish bar two years later. Here his success was highly respectable, but not astonishing, as his extensive learning, sound judgment, and great industry were marred by indifferent oratory. In 1766 he was appointed one of the judges of the Conrt of Session, and assumed the title by which he is chiefly known to posterity. In this office his accuracy, diligence, judicial impartiality, and dignified demeanour secured him the highest respect, and ten years later he was made a justiciary lord. At his country-seat of New Hailes, five

miles from Edinburgh, he gave his leisure to uninterrupted literary activity, on behalf of religion and in elucidation of early Scottish history. And though his official duties were ardnons, he found time to compose mimerons works, surpassing in value those of many men whose lives have been wholly devoted to literature. He was much esteemed by Dr Johnson, and corresponded with some of the greatest men of his time. He died 29th November 1792. His funcral sermon was preached by 'Jupiter' ('arlyle; his appearance remains to us in a characteristic portrait by Kay.

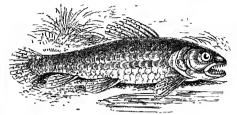
Among his books are Select Discourses, by John Smith of Cambridge (1756); A Discourse on the Gowrie Conspiracy (1757); Memorials and Letters relating to the History of Britain in the Reym of James I. (1762), a curious and interesting volume; The Works of the evermenorable Mr John Hales of Eton (3 vols. 1765); Memorials and Letters relating to the History of Britain in the Reign of Charles I. (1766); Annils of Scotland from the Accession of Malcolm III., surnamed Canmore, to the Accession of Robert I. (1776); and Annals of Scotland from the Accession of Robert I., surnamed the Bruce, to the Accession of the House of Shaar (1779). The last two form one continuous matter-of-fact history of the greatest possible value, which Dr Johnson valued above the painted histories more to the taste of our age. Besides these, Dalrymple wrote works on legal antiquities and ancient church history, edited old Scotch poems, and published sketches of the lives of various notable Scotchmon, as specimens of how a Biographia Scotica might be executed.

Haileybury College, 2 miles SE. of Hertford, erected in 1809 by the East India Company from the design of William Wilkins, R.A., as a place of training for eadets in their service, and so occupied until the transference in 185s of the powers of the Company to the crown. An interval then ensued during which the college remained absolutely empty, though the solitade was for a few months broken by the arrival of a regiment from India, fresh from the mutiny; but the building was not suited for barracks, and it was soon again deserted. For a while there was a talk of converting it into a workhouse, but happily a better fate was in store for the place: the enterprise of several county gentlemen successfully carried through a scheme for establishing at Haileybury a new public school, and in September 1862 the school was opened, its numbers being limited under its charter to 500. Five exhibitions of from £60 to £20, tenable for three years at Oxford or Cambridge, and in some cases elsewhere, are open yearly for campetition to members of the school who are under mineteen years of age; another of £50 is available every third year, and there are nine scholarships for boys at the school. Among the professors on the staff of the East India Company were Malthus, the political economist; Sir James Mackintosh, the philosophical historian; William Empson, editor of the Edinburgh Review; and Sir Monier Monier-Williams, Boden-Sanserit professor at Oxford; and among the students who afterwards became illustrious, John Lawrence, ruler of the Punjab in the time of the Indian Mutiny, afterwards Lord Lawrence, Viceroy of India; Sir Charles Trevelyan; Bishop Forbes; and Sir Honry Bartle Edward Frere. See Hailey-burian for 1883, and Higgen's account of Old and New Haileybury (1887).

Hail, Mary. See Ave Maria.

Haimura (Erythrinus macrodon), a large freshwater fish of Guiana, belonging to a small group of fishes (Erythrinina), family Characinidæ (Günther). It measures from 3½ to 4 feet in length; its flesh is firm, and well flavoured; and at times the fish is so abundant that it forms the principal article of food with the Indians, who capture it by hook or in an ingeniously contrived trap. It is very voracious.

The jaws are very powerful, and the teeth are large and can inflict serious wounds: a man's hand has



Haimura

been cut off by them. The haimura particularly abounds near rapids and falls in the upper parts of the rivers of Gniana.

Hainan, an island of China, the southernmost land of the empire, lying between the Gulf of Tongking and the China Sea, and 15 miles S. from the mainland. It forms part of the province of Kwangting, and measures about 150 miles (from southwest to north-east) by 100. The centre and south of the island are monutainous; on the north the monutains are fringed with fertile plains, well watered by rivers. The island, which is purely agricultural, produces rice, sesamum-seeds, ground-mits, sugar, sweet potatoes, taro, cocoa-mits, indigo, beans in the produces rice, sesamum-seeds, ground-mits, sugar, sweet potatoes, taro, cocoa-mits, indigo, beans in the produces. Exports—pigs, sugar, sesamum-seeds, ground-mit cakes, hetel-mits, and eggs; annual value, £316,450. Imports—opium, cotton and woollen goods, and rice; annual value, £410,000. The capital is Kinng-chow (pop. 40,000), the port of which, Hoi-how (15,000), 3 miles distant, has been open to foreign trade since 1876. The inhabitants number altogether about two and a half millions, the plains being inhabited by Chinese (11 millions), the monotainous and unknown interior by the aboriginal Les. Eight to ten thousand Chinese emigrants leave Kinng-chow every year for Singapore and Bangkok. Plants and animals, especially birds and fishes, are numerons. Gold exists. The island is subject to frequent earthquakes, and in summer to typhoons. See B. C. Henry's Ling-Nam (1886).

Hainault (formerly spelt in a perplexing variety of ways from Haysneaulta to Hèno; Ger. Hennegau), a southern province of Belgium. Area, 1437 sq. m.; pop. (1887) 1,041,719, principally Walloons. The surface consists in the north and west of flat and fruitful plains; the south is occupied by spurs of the Forest of Ardennes. The principal rivers are the Haine—from which the province has its uame—the Scheldt, the Dender, and the Sambre, the last a tributary of the Mense. The sail is highly productive; wheat and flax are very extensively grown. Valuable crops of fruit, vegetables, and beet are produced. Excellent breeds of horses, horned cattle, and sheep are reared. Toward the sunth and south-east, in the neighbourhood of Mons and Charleroi, are very extensive coallields, from which about 2,000,000 tons of coal are annually extracted. Iron is also produced in considerable quantity, and marble, building-stone, and limestone are quarried. Linen, porcelain, iron and steel goods, lace, paper, leather, &c., are extensively manufactured. The capital is Mons. From the 9th contury Hainault was the name of a countship, which embraced the modern districts of both French and Belgian Hainault. For many years (1030–1279) the history of the countship was closely connected with that of Flanders (q.v.). From 1845 to 1433 it belonged to the royal house of Bavaria, and then passed to Burgundy, the fortunes

of which duchy it shared down to the French Revolution. French Hainault (now the department of Nord) was, however, formed out of the county after the treaty of the Pyrenee (1659). The present Belgian province was constituted in 1815. For Hainault Forest, see Epping.

Hainburg, a walled town of Anstria, on the Dannbe, 27 miles ESE. of Vienna, with a rayal tobacco factory. It is usually identified with the ancient Carunatum (q.v.); and a Roman aquednet still supplies its market-place with water. In the Nibelungative the castle of Hainburg is called Heimburg, the border fortress of the country of the Huns. It was taken from the Hungarians in 1042 by the Emperor Henry III., and afterwards became a residence of the Austrian princes. In 1482 it was stormed by Matthew Corvinns, in 1683 by the Turks; and in 1827 it was burned to the ground. Pop. 4857.

Hainichen, a town of Saxony, the centre of the German flannel manufacture, lies 13 miles NE. of Chemnitz. Besides its staple product, it also manufactures cloth, leather, chemille, and plush. Here Gellert was born in 1715. Pop. 8053.

With the exception of the palms of the hands and the soles of the feet, the human skin is almost everywhere studded over with hairs. In few localities, however, does the hair attain any degree of thickness or length. Except on the sculp, the male cheeks, &c., the hairs are line, short, and scanty, but more apparent in the male than the female.

An individual hair may be regarded as consisting of a root, a shaft, and a point. The root is the short, soft bulbous portion which is withdrawn from the skin when a hair is plucked from the body; the shaft is the part which projects beyond the surface of the integument; and the point is its attenu-

ated free extremity.

The root of the hair is enclosed within a minute tulular depression in the skin which is termed the hair folliele. This is the chamber in which the hair is manufactured, and it is here also that additions are made to its root so that it increases in length. The skin is composed of two layers: an outer epidermis and an inner corium. The epidermis is the cellular protective layer, and the hair and nails may be regarded as outgrowths from it. Amongst the lower animals the claws, hoofs, spines, eathers, scales, &c. all belong to the same category—all, like the hair, are appendages of the cpidermal layer of the skin. The corium is fibrous and vascular, and rests directly mon the fatty subcutaneous tissue of the body. Both layers of the skin take part in the formation of the hair-follicle. Its wall, therefore, has two distinct layers entering into its formation—the inner layer heing cellular and epidermic, whilst the outer layer is fibrous and continuous with the corium. When a hair is wrenched out of its socket the inner layer of the follicle adheres to the root, and is in great part withdrawn with it. It is therefore termed the rootsheath. In the case of the short hairs the hair-follicles do not sink beyond the skin, but in the case of the head-hairs and heard they are much deeper, and penetrate into the subcutaneous fatty tissne.

The extremity of a fresh hair-root is expanded in the form of a knob, called the hair-bulb. This hair-bulb is composed of cells like those of the rootsheath, and at the bottom of the follicle the two are directly continuous with cach other around the circumference of the bulb. Again, at the bottom of the hair-follicle there is a little fungiform projection continuous with the corium. It is called the hairpapilla, and is plentifully supplied with both blood-vessels and nerves. This papilla is of the utmost importance in connection with the process of hair-growth. It is also an agent in fixing the hair in its follicle, because the lower aspect of the hair-balb is hollowed out into a cavity, and the papilla is received into this in the same manner as a head is received into a cap.

In structure a hair may be considered as being composed of three distinct parts. Its chief bulk consists of fibrous substance; this

is conted on the ontside by a thin scaly layer, termed the haircuticle, whilst its centre is traversed by a parrow cellular thread or core, which is termed the med-ulla. The hair-cuticle is exceed-ingly thin, and is formed by a single layer of minute flat scales deposited upon the surface of the hair. These scales overlap each other in an upward direction from the root to the point of the hair. The free uncovered margins of the enticular scales therefore look upwards towards the point, and when examined under the microscope they appear on the surface of the hair in the form of wavy lines, and at the same time give to its outline a slightly toofhed or serrated appearance. It is the arrangement of these scales which gives to hair its commercial value. It is due to them that the felling of hair is possible. But human hair is ill adapted for this purpose, because the cuticular scales are closely applied to the hody of the hair. In wool, however, the scales stand well out, and the the scales stand wen out, and the serrations are so distinct that the hairs interlock firmly the one with the other.

""", policynis, b, har; c, hair bulb; d, d, oligiands, e, fat cells.



Fig. 1. Vertical section of Skin, showing hair-follicle:

We have mentioned that the hair-root is attached to its follicle (1) by a continnity at the bottom of the follicle of the cells composing the hair-bulb and those forming the routsheath, and (2) by the hair bulb being moulded over the surface of the fungi-form hair papilla. There is yet a third connection. The follicle is lined by delicate imbricated scales, which are directed downwards and interlock with the up-

wardly-directed scales which cout the hair-root.

The fibrous substance of the hair is composed of flattened fibres applied to each other in the longitudinal direction, and firmly united by intervening cement-substance. These fibres can be still further

resolved into minute flattened elongated plates or cells, which constitute the ultimate elements of the fibrous substance. The pigment or colouring matter of the hair is distributed throughout the fibrous substance. is partly placed within the cells which build up the fibres, and partly in the cement-substance which glues the cells together. But the colour of a cells together. But the colour of a hair is not entirely determined by Surface of a the quantity or kind of pigment human Hair, magnified.

extent determined by the presence of air which is contained in minute chinks or crannies in the fibrous substance. These air-



Fig. 2.

spaces are nuncrous in white hairs, but are almost entirely absent in black hairs.

The central medulla is not present in every hair, nor, indeed, is it to be found throughout the entire length of those hairs in which it exists. Thus it is absent in the fine short hairs of the hody, and also

506 HAIR

in a large proportion of the hairs of the scalu. structure it consists of two or three rows of rectangular cells, which contain a certain amount of air.

The structure of human hair is such that it can almost always be distinguished from hair drawn from other sources. At the same time it should be noted that the hair of certain of the anthropoid apes (more especially the Chimpanzee and Gorilla) resembles it so closely, both in structure and in microscopical appearance, that the differentiation world be matter of extreme difficulty—if indeed it were possible. Waldeyer, in his Atlas der Menschlichen und Thierischen Haare (1884), gives a series of beautiful illustrations in which the hair of man may be compared with that of certain of the lower animals.

In connection with each hair there is a remarkable contrivance by means of which it is kept smooth, glossy, and pliant. It is furnished with two or more oil-glands, which secrete a greasy fluid. Each of these glands consists of a little sacculated ponch which opens into the hair-folliele near its orifice by a short duct or channel of exit. The oily matter which is formed in the gland is discharged into the hair follicle, and thus upon the surface of the hair.

Hairs are likewise provided with minute unseles. These consist of slender bands of contractile tissue, which cross the obtuse angle which is formed by the hair follicle and the surface of the skin. one hand this little muscle is attached to the superficial part of the true skin, and on the other to the lower end of the hair-fallicle. They are not under the control of the will, but cold and certain emotions, such as horror and tear, will bring them into play. In such cases the hair-unseles contract; they straighten the hair-follicles and erect the hairs.

The condition known as 'goose-skin' is the result.

The hair-follicle is the laboratory in which the manufacture and continued growth of the hair is effected. At the bottom of the follicle is the little papilla upon which the hair bulb is moulded. The blood-vessels of the papilla supply the material necessary for the growth of the hair. Additions are made to its base, and as it rises up in the follicle its npwardly directed scaly covering sweeps before it the scales lining the follicle. The scales which are thus carried to the surface constitute a part of the scarf of the head. The rate at which the hair grows differs very much in different parts of the body, and it is also said to be affected by the age of the individual, the age of the particular hair under investigation, the season of the year, and even the hour of the day. The average growth of the beard has been computed to he 61 inches each year. In the growth of the head-hair the greatest discrepancies exist in the results obtained by different observers. In young females who have lost their hair by fevers it has been noticed to grow at the rate of 7 inches each year.

When the growth is good the average length of hair on the female head will be found to vary from 22 to 28 inches. Anything heyond this must be regarded as exceptional. Cases, it is true, are recorded in which it has measured from 5 to 6 feet; but these are very rare. In the 'Hair Court' of the 1862 international exhibition there was a specimen of jet-black hair measuring 74 inches. But most extraordinary instances are recorded of the power of hair-growth possessed by certain of the North American Indians. A chief of the Crow tribe is mentioned by Catlin as having hair of the almost incredible length of 10 feet 7 inches.

The duration of hair-life is limited, and sooner or later it is shed. Indeed it is stated that the hairs of an infant are completely shed within a year after birth; those on the body and limbs go first, whilst the hairs of the head and the eyelashes

This change is carried on almost imperceptibly, seeing that the place of the falling hairs is taken by a second crop. The process of loss and renewal is very simple. The old hair is detached from the papilla, and soon another hair makes its appearance at the bottom of the same follicle, and grows towards its orifice. The detached hair is thus thrust out and shed. The whole process is not unlike the replacement of the milk teeth in the child by the permanent teeth. The second crop of hair which appears is perennial. An cyclash has been calculated to remain attached for 110 days. A head-hair has a longer period of life. It lives from two to four years. Before it dies pravision is made for its successor, and so the provision is made for its successor, and so the process of shedding and renewal goes on continually. During its life a hair is only capable of growing a certain determinate length. The circumstance which determines this length is the amount of untritive material which can be drawn from the blood-vessels of the papilla. Thus when a hair has blood-vessels of the papilla. Thus when a hair has attained its full length it will resume growth for a second time on being cut short. It is only when the loss exceeds the powers of renewal that a tendency to baldness results. In the case of the female head the daily loss may contain a quarter of the hairs shed of a length under 6 inches without giving rise to apprehension. Should the number of fallen short haus exceed this proportion the hair loss is almormal, and buldness is likely to ensue.

loss is abnormal, and baldness is likely to ensue.

As age advances the hair becomes gray. This is a natural and physiological process; but it may be hastened by sovere trouble or other causes. In many cases the premature blanching of the hair is hereditary. When the change is taking place party-coloured hairs may be frequently found; of these it is the basal portion which is white, while the terminal part retains its colour. Brown-Séquard made some interesting experiments on his own heard whilst it was turning erry. He marked own beard whilst it was turning gray. He marked certain of the coloured hairs, and kept a constant watch on them. He states that in some cases an entire hair would turn gray in the course of a night. Two factors would seem to be at work in producing this condition of hair—viz. a loss of the power to produce pigment, and an increase of air in the shaft of the hair. Sometimes the change occurs rapidly-in the course, perhaps, of a few hours. Well-authenticated cases of this are on record. It is said that the anburn hair of Marie Antoinette turned gray in a single night. Surgeon Parry asserts that he actually saw the jet back hair of a rebel sepoy whilst under examination and the fear of a horrible death turn gray in the course of half an honr. Baron Alphonse de Rothschild during the Commune is another instance. It is difficult to give any reasonable explanation of these

sudden cases of hair-blanching.

The hair is regarded by anthropologists as being of high importance as a race character. Although there is no one special colour of hair peculiar to any one race, this character must not be disregarded. In our own country we may see every line from the fairest flaxen to the blackest jet. Without doubt this points to a diversity of origin. Independently of colour, however, there are characters present in the hair which separate many of the races of man widely from each other. In the American Indians, Chinese, Japanese, and natives of High Asia the hair is long, straight, and harsh like a horse's mano. Amongst the negroes, Hottentots, and Papnans it is crisp and woully. Between these extremes we may place the European, in whom the hair is wavy and flowing. The close curling of the negroes' hair has been shown by several observers to be largely due to the fact that the hair-follicles are curved. A spiral twist is thus given to the hair. It has been held that the straight harsh bair of the American Indian is circular in transverse section, that the wavy European hair is oval, and that the crisp woolly negro hair is flattened and tape-like in cross-section. There now appears to be reason to doubt this (see Waldeyer's Atlas).

The chief use of the hair, and particularly of

the fur of various mammals which is especially developed in the winter, is to protect the body from external cold. Except on the scalp and on the external cold. Except on the scalp and on the throat, this cannot be considered as applying to man. What, then, are the uses of the hair on the face, and especially on the upper lip? We shall answer this question with an extract from an article 'On the Use of the Hair' in the Lancet for November 3, 1860: 'Mr Chadwick, who has done so much for sanitary reform, tells us that he was once very much struck by seeing some blacksmiths who were heards, with their monstaches discoloured by a quantity of iron dust which had accumulated amongst the hairs. Turning it over in his mind, it struck him that had not the dust been so arrested by a natural respirator, it must have found its way into the langs, where it could not have been otherwise than productive of evil consequences. He hence rightly advised that the razor should be discarded by labourers in all dusty trades-such as millers, bakers, masons, &c.; by workmen employed dusty roads. In hot, sandy countries the use of the beard is soon discovered; and travellers in Syria and Egypt find it necessary to defend their mouths against the entrance of the hot air of the desert. But not against dust alone is the facial hair a protection; it is the best barrier against cold air, biting winds, and wheezy fogs that a Northman can obtain. . . According to Mr Chadwick, the sappers and uniners of the Freuch army, who are remarkable for the size and beauty of their beards, enjoy a special immunity against brouchial affections. In corrabaration of the last-named fact we may mention another of a still more striking character. During the long-continued search for Franklin's expedition, a transport vessel, the North Star, was frozen up during one of the severest arctic winters on record, in Wolstenholme Sound. The crew maintained their health perfectly during all the trials to which they were exposed. Ou their return to England in the early summer they shaved off the hair that had been growing around the month and throat for the last eight or nine months, and within a week every man was on the sick list with some form of bronchial or pulmonary disorder.

The short hairs scattered over the body may be regarded as being radimentary. In other words, they are vestiges of a hairy covering which at one time did fulfil a protective and sheltering function. In the Ainos of Japan and the Todas of the Nilgherries these hairs are still retained in a high

degree of development.

Cases occasionally occur where there is an abnormal abundance of hair of considerable length in women on parts where the hair is usually little more than down. A hairy woman, named Julia Pastrana, supposed to be a Mexican, was exhibited in London; her embalmed body was exhibited also in that city in 1862, and we extract the following remarks from a memoir on her in The Lancet for May 3 of that year: 'The ears, and all parts of the face except the eyes, were covered with hair of different lengths. The heard was tolerably thick, the hairs composing it being straight, black, and bristly, the part of it which grew on the sides of the chin hanging down like two plaits. . . . The upper portion of the back of the neck and the hinder surface of the ears were covered with hairs. On the shoulders and legs the hairs were as abundant as they are occasionally

seeu on very powerful men.' Dr Chowne described similar but less marked cases of hairy women in the Lancet for 1843; and in 1886 members of a Brunese family, whose bodies were almost entirely covered with hair, were first exhibited in London. See Beard, Wig, Baldness, Plica Polonica, Ringworm, Scaldhead, Parasites, &c.; also Sir Erasums Wilson, Healthy Skin and Hair (1845; new ed. 1886).

Hair-balls. See Concretions.

Hair-dressing. As a matter of convenience, as well as of taste and fashion, the dressing of the hair has received much attention in all civilised nations, ancient and modern. The Beard is the subject of a separate article. Amongst savages the most extraordinary diversity as to the dressing of their hair obtains; some frizzing it to the utmost extent; some fixing it in all sorts of perverse arrangements by means of frames, and some partially shaving the head. The Chinese pigtail, the American Indian scalp-lock, and the Moslem shaven head, with a small tuft left by which to be ultimately lifted into Paradise, are all well known. According to Rev. J. G. Paton, missionary (see his Life, 1889), some of the New Hebrides people have hair crisp and woolly, stuck full of feathers and shells; others have hair long and wavy, twisted into as many as 700 separate whip cords on a single head, requiring the labour of five years to complete. Amongst modern civilised Europeans the cautiers and cavaliers of the 17th century adopted the practice of wearing those 'love locks' which excited the ire of the Paritans. It was, however, in the management of ladies' hair that the art of the professional hair-dresser was in those times mainly exercised. In the 18th century, through the influence of French fashions, the dressing of hair, male and female, rose to a great pitch of extravagance and folly (see Wio). The hair of a lady of fashion was frizzed up in convolutions and curls, decorated with ribbons, jewels, and and curis, decorated with rubbons, jewels, and feathers, and filled with pomatum and powder to a degree perfectly monstrous. As women of less exalted rank slavishly attempted to follow these absurdities, the business of dressing hair was extensively followed. The cost of a full dressing being, however, too high to be lightly incurred, often one dressing was made to suffice for a week or fortnight, during which period such case was or forthight, during which period such care was taken to preserve the greasy fabric undisturbed, that it became the frequent resort of trouble-some insects. From pressure of business it frequently happened that previous to balls ladies' hair had to be dressed one or two days in advance; and to keep the head-dress uninjured the lady sat in a chair perhaps two nights instead of going to bed. A tax on Hair-powder (q.v.), along with the simplification of fashions consequent on the French Revolution, not only expelled hair-powder and perruques, but brought the pro-fession of hair-dresser within reasonable bounds. As regards ladies' hair, fashion is constantly altering. With respect to men's hair, short cutting is now nuiversal. Pursued as an ordinary business in England and continental countries, hair-dressing in the United States is to a large extent resigned to men of colour, and in connection with many of the hotels they are provided with workrooms. Of the innumerable oils, essences, and pomade which are vended for the hair, on the doubtful assumption that they improve and nourish it, some are distinctly injurious.

Hair-dyes. Various means have been adopted for changing the natural colour of the hair to a more favoured one, and for hiding the approaches of age, as indicated by the presence of gray hairs. These usually consist in washing the hair with a

solution of some metallie salt known to have the effect of darkening its colone, such as salts of silver, mercury, lead, and bismuth. Pyrogallie acid is also employed to give a brown tint, while a solution of peroxide of hydrogen in water imparts a line golden colone. The most perfect mode of dyeing the hair black is that of previously preparing it by a complete saaking with a solution of sulphide of potassium; the strength of this solution must depend on the depth of tint intended to be given; the stronger the solution the darker the colone will be. When thoroughly wetted, the hair is allowed to dry partially; and whilst still damp it is to be saturated with a solution of nitrate of silver, of a strength proportionate to the depth of colone desired. This makes a very permanent dye, which only requires renewing where the new growth of hair becomes conspicuous. The fashion of dyeing the hair is very ancient, and belongs as much to savage as to civilised nations; but in the case of the former vegetable dyes have been chiefly used. In China and other eastern countries the juice of the petals of Hibiscus Trionum, the Bladder-Ketmia, and probably other species of Hibiscus, is in general use.

mum, the Bladder-Rethina, and probably other species of Hibiscus, is in general use.

The detection of stained hair is sometimes an object of medico-legal investigation. Lead may be detected by boiling the hair in dilute nitric acid, and then applying the tests for Lead (q.v.) to the acid solution; while the presence of silver may be shown by digesting the hair in dilute hydrochlaric acid or chlorine water, when the resulting chloride of silver may be dissolved out with a solution of ammonia, and sulmitted to the ordinary tests for

Silver (q.v.).

Mair-eel, the form into which horse-hairs left to soak in running water are preposterously assumed by many to develop. The hair-eel or horse-hair worm is really a Nematode (q.v.); see also EEL, THREAD-WORMS.

Mair Grass (Aira), a genus of grasses, having delicately panieled inflorescences, bearing spikelets with two unequal glumes, and two perfect llowers, each with two thin membranons bracts, of which the onter is generally awned. The species are natives of temperate and cold climates. Five species are natives of Britain, and are chiefly found in moors, sandy pastures, and other situations where the soil is unfertile. The Tufted Hair Grass, or Turfy Hair Grass (A. caspitosa), common in better pastures and meadows, is a beautiful grass when in flower, but forms coarse tufts of very rough leaves, which are usually rejected by eattle. It attains a height of 2 to 4 feet, and is sometimes used for thatching ricks of hay or corn, and in some places for making mats. It grows havnically in moist situations, and indicates a badly drained soil. It is occasionally telerated, in order to add to the bulk of Boy Hay in moorish grounds, lint is carefully extirpated wherever agricultural improvement takes place. This grass is, however, sometimes sown to form cover for game, particularly hares; and in marshy situations for snipes and wild fowl. It is the windlestrae of the Scotch.

Hair Manufactures. In this article the various kinds of hair (except wool) used in manufactures are noticed, together with the different fabrics or articles made from thom. Remarks on a few of these will be found under Alpaca, Bristles, Brush, and Fibrous Substances. For sheep's wool, which like fur is modified hair, and the similar annual fibres mohair and alpaca, see Woollen Manufactures. For covered skins used for articles of dress in their natural condition, with just sufficient treatment to preserve them, are described under Fur; while the employment of wool, fur, and hair in the manufacture of

felted goods is noticed under the headings Felt and Har.

Human Hair.—The trade in Britain in this is considerable, supplies of it being chiefly obtained from continental Europe, India, and China. The hair shipped from Asiatic countries is coarse, that from Germany and Scaudinavia is light-coloured, and that collected in Italy and southern France is dark. In former years an occasional supply of good quality was got from Ireland. Hair 8 inches long is worth about 1s. per ounce, while such as extends to the length of 3 feet sometimes reaches as high a price as 30s. per ounce. Certain colours, such as pure golden, are of greater value than more common kinds, and hair from the living subject is much better than dead hair. Human hair is worked up into watch-guards, brooches, bracelets, and other personal ornaments, the patterns of which are often very beautiful. In the article Wig this and other initiations in hair of the natural covering of the head are noticed.

Horse hair.—The comparatively small quantity of this hair obtained in England is got from the combings of tails and manes, but it is of excellent quality. Horse-hair is imported from Russia, Germany, Belgium, South America, and Australia; the imports for the five years ending 1888 averaging nearly 20,000 cwt. annually. The United States import hair to the value of from 21 to 2½ million dollars annually; exporting a value of from the tails of horses is the most valuable, that from the mane being of inferior quality. The former is designated 'hard,' and the latter 'soft,' while the hair is further distinguished by the terms 'live' and 'dead,' according as it has been taken from the animal before or after death. 'Live' hair commands the highest price. White is the most valuable kind as regards colour, as it is smitable for dyeing bright tints, and the best hair is obtained from wild horses.

House-hair undergoes three sortings—viz. into sorts according to length, into different colours, and into various qualities. After this the hair is washed generally in warm soap baths and in water slightly heated, to which lime or potash has been added. The hair, except the white sort, which is to be bleached, is, after cleaning passed through a dye hath in which logwood is the chief ingredient. Short hair being used for stuffing in upholstery work, and long huir chiefly for the manufacture of hair cloth, the two kinds after the above treatment

undergo different processes.

Short horse-hair, although best for the purpose when used alone, is nevertheless mixed with cow and pig hair for stuffing chairs, sofas, and the like. Different blends of these are made, and the three kinds thoroughly incorporated by suitable machines, after which the mixture is beaten and screened to clear it of dust. Then follows the 'curling process, by which the hair is first spun into ropes, which are next twisted into much shorter lengths, and by a third operation further twisted till they get into a convolute shape. The earl thus given requires to be fixed by placing the hair in cold water for several hours, and afterwards in an oven, where it is kept for some time at a high temperature. This baking also destroys the eggs of obnoxions insects. The hair in this rope form requires to be teased up for use. For inferior stuffing vegetable fibres are now mixed with hair.

Hairloth.—Long horse-hair is combed on steel combs, and separated into different lengths and thicknesses, about 3 feet boing the longest size. The chief application of long hair is in the manufacture of haireloth, which is generally though not always black. Even when naturally black the hair is dyed to give it a uniform colonr. White hair is

bleached and dyed different colours. The length of the hair determines the width of the cloth, since the weft is formed of single hairs. Strong linen or cotton twist commonly form the warp. Up to the middle of the 19th century a child at one side of a hundloom supplied a hair to the weaver for each throw of the shuttle, to which the hair was hooked. A subsequent invention made it practicable to dispense with the child or server, the weaver by means of a treadle working both the hook-shuttle for drawing through, and the batten for driving home, the west hairs; and at the same time supplying these hairs with his or her own hands.

The power-loom, invented by Mr Isaae Lindsley, of Pawtncket, Rhode Island, was the first successful attempt to supersede the hand-loom in the weaving of haircloth. In it the end of an arm or rod, made to operate like a finger and thumb, grasps the hairs as they are presented to it by a picker which takes up a single hair from a bunch, and this hair is then carried by the rod through the shed of the warp. This loom has been extensively used in the manifacture of haircloth. In some more recent ones, however, the working parts have been simplified, and an important arrangement introduced by which the thin and the thick ends of the

Hair are taken up by the picker alternately.

Haircloth is so woven that only the hair portion is seen on the surface, the linen or cotton warp being hidden. Most of what is made in England is plain, but some haircloth damasks, both black and various coloured, are woven; so also are striped pieces of various colours. These ornamental kinds, which are well suited for elegant furniture in tropical regions, are largely made on the Continent. In some special kinds of tabric both warp and weft are of horse-hair. Among these are sieve-bottoms or norse-nar. Among these are seve-notating for cooks, chemists, and powder manufacturers. Other examples are press-cloths used in making eider, and tailors' ironing cloths. Horse-hair is worked up into ornamental cord-like or braid-like forms (crinoline) for ladies' bonnets, into horders and cords for carriages, into material for eigan-cases and simple partials. and similar articles, and into fishing-lines.

Brussels carpet of horse-hair was introduced by Mr E. Webb of Worcester. Several kinds of carpet partly or wholly composed of this material are now made. In these tissues the hair is not woven in the same way as it is in ordinary hairwoven in the same way as it is in ordinary nar-cloth, but as a yarn for which short hair, some-times mixed with the hair of other animals, is generally used. The material is carded, spun, and twisted. Some carpets have both warp and weft of hair; others have only a plain warp of hair with a weft of inte; others again have a hacking and weft of hemp, jute, or cotton, and the pile warp of horse-hair. These carpets are extremely durable, and therefore well suited for offices and other rooms in

which there is much traffic.

Cow-hair is consumed in considerable quantities by plasterers to bind the plaster put on the internal walls of houses. As already stated, it is mixed with horse-hair for stuffing purposes, and with wool for common blankets, carpets, rugs, and other articles. Cow-hair is also used in the manufacture of roofing and other felts. This kind of hair is obtained in considerable quantities from tanneries. The imports of it in 1888 amounted to 95,000 cwt.

Camel-hair is obtained from the legs, the neek, and the lumps of both species of Camel (q.v.). The hair of the Arabian camel is fine and light-coloured; that from the Bactrian camel is coarser, and of a darker shade. It, however, varies in degree of fineness according to the age of the animals, young ones yielding the finest kind. In Tartary, Persia, Arabia, and other eastern countries camel-hair is woven into a soft, warm, and durable cloth for personal wear. It is also made into earpets, teut-

eoverings, and other articles. Since 1860 a good deal of this hair has been sent to Europe and America for weaving into carpets and for mixing with wool; in the case of the liner kinds, for warm clothing. The so-called camel-hair brushes are made from the tail of the sable or of some kinds of squirrel.

Gout-hair.—The hair of the common goat is used for the manufacture of cheap carpets and for other purposes, but that of the Angora or mohair goat is now a very important material in our textile in-dustries. This mohair, as it is called, is described under WOOLLEN MANUFACTURES, and the fine wool forming part of the fleece of the Cashmere or shawl goat is noticed under Cashmere Goat, Shawl.

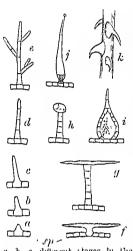
Pig-hair or Bristles.—Some pig-hair is mixed with other kinds for stuffing. The principal use of this material, however, is for making brushes. See Bristles and Brushes.

Elephant's Hair.—The strong hair of the elephant's tail is occasionally turned to some use. For example, a native biaselet is employed by some of the tilbes in Nyassaland, which consists simply of two such hairs plaited.

Hair-powder, a pure white powder, made from pulverised starch, scented with violet or some other perfume, and at one time, especially in the 17th and 18th centuries, largely used for powdering over the head. The fashion became universal among the higher and middle classes, and by ladies as well as gentlemen. To make the powder hold, the hair was usually greased with pomade, and accordingly the fashion was extremely troublesome. An act of parliament fixed that the fine dust of which the powder was composed should be made from stareli alone; and we learn from the Gentleman's Magazine, that on November 20, 1746, fiftyone barbers were convicted before the Commissioners of Excise at London, and fined £20 each, for having in their keeping hair powder not made of starch, contrary to act of parliament. In 1795 a tax of a guinea (afterwards £1, 3s. 6d.) was put on the use of hair-powder, and at one time yielded £20,000 per annum, but it had the effect of causing hair-powder to fall into general disuse. The French Revolution, which overturned so many institutions, contributed also to the people of Europe returning to natural and unpowdered hair. At the present day powder continues to be used by some of the footneen of the nobility and higher ranks as part of their livery. The tax on hair-powder was repealed in 1869. At the time of its abolition it was paid by about 800 persons, and yielded a revenue of about £1000 a year,

Hairs of Plants are outgrowths of epidermal cells, which assume various forms. They may remain unicellular, resembling simple tubes, or become multicellular by division of the originally simple cell. They develop on almost any part of the surface of plants; and there are few plants that are entirely without them. A plant may have only one form of high label where only one form of high label when the have have only one form of hair; but most plants have several forms. Similar kinds of hairs are often characteristic of plants belonging to the same order -e.g. the glandular hairs of the sun-dew (Drasera) order, the stinging hairs of the nettle (Urtica) order, and the scaly hairs of ferns. Root-hairs (see Root) are among the simplest in form; they are always unicellular tubes which absorb water and certain minerals essential for the life of the plant. The acrial organs of plants develop hairs which serve to protect them from cold, or injury from other sources—e.g. many winter buds have hairy scale leaves which often, with a gumny secretion, keep out moisture, and thus protect the tender tissnes from injury by frost. Many leaves also are protected from excessive radiation by the

growth of hairs. The common form of glandular hair is that with a swallen tip which secretes oily or resinons, often strongly-smelling, matters which



a, b, c, different stages in the development of a root-haw; d, harrol pelargonium; e, hanched hair of fixweel (Sisymbrum); f, hair of wallflower; q, hair of chrysanthenium; h, hair with gland at the tip; t, hair with swollenglandulal base; f, stinging hair with drop of poison at the tip (all the above are in section); h, prickles of bramble; ep, epidenius.

may lie regarded as waste-products that have become adapted to the attraction and capture of insects (see INSECTIVOROUS PLANTS). Some glandular hairs have the glands within their In the orders bases. Composite and Valerianea hairs form on the fruit an organ of flight (pappus), by means of which the wind is enabled to earry the seeds, and thus secure their wide distribution. When hairs become stiff. generally by impreg-nation with silica, they form bristles; and when they become woody and hard they form prickles, as in the bramble and rose. llairs may also grow internally in large interrellular spaces, but these occur only in a few plants.

Mair-tail (Trichiurus), a genus of acanthopterous fishes he-

longing to the tropical marine fauna, and found generally near land. The body is long, scaleless, greatly compressed, ribbon-shaped, and ends in a long, whip-like tail. The eleft of the month is deep, and there are strong teoth on the jaws and the palate. The dorsal fin extends along the whole of the back and is spiny throughout; the ventral fins, when present, are in the form of a pair of scales; the anal spines are small, and are sometimes concealed beneath the skin. Six species are known. Some of them attain a length of four feet. One species, the Silvery Hair-tail or Ribbonfish (T. lepturus), is found in the Atlantic Ocean, on the east coast of North America, from Cape Cod to Florida and the West Indies. Wanderers are caught off the British and Irish and more rarely the French coasts. The other species are most common in the seas of India, the Malay Archipelago, and China. As food they are held in various estimation in different places.

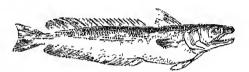
Haiti. See HAYTI. Haje. See COBRA.

Hajipur, a town of Bengal, on the Gandak, just above its confluence with the Ganges opposite Patna. It has a large river trade. Pop. 25,078.

Hajj, or Hadj, from an Arabic word meaning 'pilgrimage,' cuphatically the pilgrimage to the Kaaba (q.v.) or black stone in the great mosque at Mecca, which every Mohammedan whose means and health permit is bound to perform once at least in his life (see Mecca). The hajj once performed, the pilgrim never omits to prefix the proud title of Hajji to his name. Those who are incapacitated through bodily infirmity from performing the holy journey themselves may send a substitute, who acts as their representative in almost every respect, but this substitute has no share whatever in the merits and rewards belonging to the Hajj. Members of the Greek and Armenian

churches who perform the pilgrimage to Jerusalem are likewise known as Hajji.

Hake (Merlucrius), a genus of fishes of the cod family (Gadidæ), having a flattened head, an elongated body, two dorsal fins, of which the first is short, and the second very long, one very long analin, and the month destinte of barbels. One species, the Common Hake (M. rulgaris), is found in the British seas, in those of the north of Europe, and in the Mediterraneau. It is sometimes 3 or 4 feet in length; and is of a whitish colour, grayish on the back. It is a very voracious fish, devoning great mumbers of herrings and pilchards; hence it



Hake (Merluccius vulgaris).

is frequently called the Herring Hale. It is a coarse fish, its flesh white and flaky; lut it is important as an article of human food and of commerce, being salted and dried in the same manner as cod and ling, in common with which it receives in this state the name of stock-fish. It is generally taken by lines, like cod and ling. In the spawning season, when it keeps near the bottom, it is sometimes caught by trawl-nets.—One other species is known, M. gayi, which is common in the Strait of Magellan and on the coasts of Chili, and also occus in New Zealand.

Hakim Ben Allah. See Mokanna.

Makinyt, or Hackhuvy, Richard, an English writer on geography, belonged to a Herofordshire family, and was born in 1553. While at Westminster School he eagerly perused narratives of voyages and travels, and continued this course at Christ Church, Oxford, whither he proceeded in 1570. Being appointed lecturer on geography or cosmography in that university, he introduced the use of globes and other geographical appliances into English schools. The publication of Divers Voyages touching the Discovery of America (1582) seems to have been mainly instrumental in procening for him two years later the appointment of chaplain to the English embassy to Paris. There he wrote Discovers concerning Western Discoveries (1584), and had Landonnière's manuscript narrative of the discovery of Florida printed, first in French and afterwards in English, at his own expense. On his return to England in 1588, with the assistance of Sir Walter Raleigh, he began to collect materials for the history of the discoveries made by his countrymen. He published the fruits of his researches, in notices of more than 200 voyages, Traffiques, and Discoveries of the English Nation (3 vols. 1598–1600; new ed. 5 vols. 1809–12). Government rewarded him by bestowing upon him a prebend in Westminster Abbey. A Selection of Curions, Rure, and Early Voyages and Histories of Interesting Discoveries, &c., chiefly published by Hakhyt, or at his suggestion, but not included in his compilation, forms (1812) a supplement to the above work. He also edited English translations of Galvano's Discoveries of the World (1601) and Fernaudo de Soto's Virginia richtly Valued (1609). He died in 1616, and was buried in Westminster Abbey. Hakhyt's mpublished manuscripts were made use of by Purchas in his Pilgrims (1625–26). The Hakluyt's mpublished manuscripts were made of publishing all the histories of the earlier voyages and travels.

Hakodate, the chief port of Yezo in Japan, structed on a peninsula in the Strait of Engan.
The town is built partly on the inner slope of the Gibraltar-like hill (1200 feet) which dominates the strait, partly on the low sandy peninsula connecting the hill with the main island. The climate is severe. Hakodate, which has a magnificent har-bour, is (since 1859) one of the open ports of Japan, and carries on a brisk export trade in seaweed, sulphur, bêche de mer, salted sahuon, &c. Valne in 1887 of exports, £116,450; of imports, £2340. Pap. (1889) 45,447.

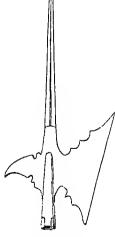
Hal, a town in South Brabant. 9 miles by rail SSW, from Brussels. The church of St Mary (1341-1409) is much resorted to by pilgrius on account of a black miracle-working wooden image of the Virgin, which during a bombardment in 1580 caught thirty-three cannon-balls in her lap they lie piled up in the tower. Pop. 9739.

Halacha. See Exegesis, TALMUD.

Halas, a town of Hungary, in the district of Little Cumania, 82 miles by rail SSE, of Budapest. Pop. 15,039.

Halberstadt, a quaint old town of Prassian Saxony, situated in a fertile plain extending from the north foot of the Harz Mountains, 25 miles SW. of Magdeburg. The cathedral, containing fine painted glass, and valuable antiquities and objects of art, although restored in 1850-71, is the most notable building in the town. It was creeted in the 13th and 14th centuries in the Pointed style. Other buildings of interest are the clurch of Our Lady (1140), with antique reliefs and wall-paint-ings; the town-house (1360-81), before which stands a Roland pillar; the wine-cellar beneath the town-house; and the Peterhof, formerly the residence of the bishops. The chief industries of the town are gloves, cigars, machines, sugar, leather, paper, spirits, &c.; and there are also large workshops for railway repairs. Halberstadt dates from 820, the year in which the sec was transplanted from Osterwieck to the site of the town of Halberstadt. It received town rights in 998; was twice burned down in the 12th century; and was held alternately by the Swedes and Imperialists during the Thirty Years' War. In 1648 it was given to War. In 1648 it was given to Pop. (1875) 27,800; (1885) 34,037. See Z-chiesche, Halber-studt sonst und jetzt (1882). Brandenburg.

Halbert, or HAL-BARD, a weapon which consisted of a strong wooden shaft about 6 feet in length, surmounted by an instrumentresembling an axe, balanced on the opposite side by a hook or pick, whilst the shaft was continued in a sharp pike-head. The weapon was much used in Germany, Switzerland, and France. In England it was a common arm from the reign of Henry VII. to that of George III. Now it is rarely seen except as borne by yeomen of the guard and others on certain ceremonial occasions. A variety of the same weapon may be recognised in the Scottish Lochaber Axe (q. v.).



Ancient Halbert-head.

Halcyon Days, a name given by the ancients to the seven days which precede and the seven

which follow the shortest day of the year, on account of a fable that during this time, while the always prevailed calms at sea. From this the phrase 'haleyon days has come to signify times of happiness and tranquillity.

Haldane, Robert, was born in London, February 28, 1764, and was educated at the grammar-school of Dundee and the university of Edinburgh. In 1780 he joined the Monarch, his uncle Viscount Dunean's ship, afterwards saw some service under Admiral Jervis, and was present at the relief of Gibraltar, but left the navy at the peace of 1783 to settle on his estate near Stirling. The French Revolution fired him with new hopes for the regeneration of man, but ere long a profound spiritual change turned the energies of his life into completely new channels. His vast project for a great unission in Bengal, at his own expense, was great interior in Dengal, at his own expense, was frustrated by the East India Company's refusal of their sanction; but by his 'Society for the Propagation of the Gospel at Home' be built so many 'tabernacles' and supported so many itineant preachers that in twelve years he had expended more than £70,000. In the year 1817 he lectured to theological students at Geneva and Montaulan, and returned to Scotland in 1819, taking an active and returned to Scotland in 1819, taking an active interest thereafter in all religious questions, as the Apocrypha and Sabbath controversies. He died 12th December 1842. His best-known books are Eridences and Authority of Divine Revelation (1816), On the Inspiration of Scripture (1828), and Exposition of the Epistle to the Romans (1835).—
JAMES ALEXANDER, brother of the preceding, was been at Thurder. July 14 1768, and was advented. born at Dundee, July 14, 1768, and was educated at the High School and university of Edinburgh, At sixteen he entered the navy, and served for nine years, after which he abruptly abandoned the service, although in the meantime he had been service, authorize in the meantime as had appointed to the command of a vessel. A study of the Bible had led him to the same conclusions in religion as his elder brother. Soon afterwards he made the acquaintance of the famous Simeon of Cambridge, and with him traversed Scotland on an evangelistic tour. His later missionary journeyings brought him into collision with the Church of Scotland, and at length in 1790 he was ordained the independent pastor of a church in Edinburgh, in which he preached gratuitously for lifty years, and which in 1808 he led into the Baptist fold. He which in 1808 he tell into the hapital fold. He died 8th February 1851. His pamphlets were widely read in their day by those within the range of his influence. Two late books were his Doctrine of the Atonement (1845) and his Exposition of the Epistle to the Galatians (1848). See Memoirs of 12. and J. A. Haldane, by Alexander Haldane (1852).

Hale, JOHN PARKER, an American statesman, was born at Rochester, New Hampshire, in 1806, and was United States attorney for his state in 1834-41. Returned to congress in 1842, as a Democrat, his name was afterwards removed from the party tieket because he refused to support the annexation of Texas. The struggle that followed ended in a victory for the anti-slavery party, and in 1847 Hale was elected to the United States senate, where he served for sixteen years. He was the Free-soil candidate for the presidency in 1852, but received under 5 per cent. of the total popular He was minister to Spain from 1865 to 1869, and died 19th November 1873.

Hale, Sir Matthew, Lord Chief-instice of England, was born 1st November 1609 at Alderley, Gloncestershire. Intended for the church, he was Gloncestershire. Intended for the church, he was sent to Oxford University in his sixteenth year. But suddenly he abandoned his studious habits, and, joining a company of strolling-players, gave way to a good deal of dissipation. He was on the

point of becoming a soldier when Serjeant Glanville induced him to adopt the legal profession. Accordingly in 1629 Hale entered the Society of Lincoln's Inn, and resuming his habits of persevering study was in due course called to the bar (1637). He soon acquired a considerable practice. In the quarrel acquired a considerable practice. In the quarrel between king and parliament Hale refrained from identifying himself with either side. When, however, parliament got the upper band, he signed the Solemn League and Covenant, sat in the Assembly of Divines at Westminster, tried to bring about a settlement between the king and parliament, and ultimately, taking his engagement to the Commonwealth, was made a judge under Cromwell in 1653. He acted as a paisae judge of the Common Pleastill Cromwell's death, but refused to have his commission renewed by Richard Cromwell. After the Restoration he was made Chief-baron of the Conrt of Exchequer, and eleven years later was transferred to the Chief-justice-hip of the Court of King's Bench. As a judge he was nente, learned, and sensible, and set his face against bribery, one of the vices of the age. He was a pious man and a friend of Richard Baxter, but, like Baxter, was not able to rise superior to the belief in witchernft. He the Crown (1739), History of the Common Law of England (1713), and various Moral and Religious Works (ed. by Thirlwall, 1805); and he bequeathed several valuable legal MSS, to Lincoln's lum. He resigned his office from ill-health in February 1076, and died on Christmas day of that year. See Lives by Burnet (1682), Williams (1835), Roseoe (1838), and Campbell (1849).

Hale, Nathan, an American soldier, who was born at Coventry, Connecticut, 6th June 1755, rose to the rank of captain in the Continental army, and, having volunteered to penetrate the British lines and procure intelligence for Washington, was detected, and executed as a spy in New York eity, 22d September 1776. See Lossing, Thr Two Spies, Nathan Hale and John André (New York, 1886).

His grand-nephew, Edward Everett Hale, was born in Boston, Massachusetts, 3d April 1822, graduated at Harvard in 1839, and was admitted to the Congregational ministry in 1842. In 1856 he was called to the South Congregational (Unitarian) Church in Boston, and in 1879 he received his doctorate from Harvard. His influence in philanthropic movements has been widespread. His book Trn Times One is Trn (Boston, 1870) originated in America a minorous series of Lend a Hand' clubs, sometimes under other names, and with offshoots in Europe, Asia, Africa, and the Pacific Islands; a recent development in the United States is the society of 'The King's Daughters.' The motto of these clubs is 'Look up and not down; look forward and not back; look ont and not in; and lond a hand.' Dr Hale has clited several religions and other journals, as well as Lingard's History of England, and original documents (from the British state papers and the British Mussum) bearing on the founding of Virginia. His published books, mostly stories, number nearly lifty.

Hale, Sarah Josepha, author of Mary's Lumb, was born at Newport, New Hampshire, October 24, 1788. On the death of her husband, David Hale, in 1822, she devoted herself to authorship, and became in 1828 editor of the Ladies' Magazine, which she continued to conduct after it had, in 1837, become united with Godey's Lady's Book; nor did she retire from her editorial work until 1877. She was instrumental in procuring the employment of lady medical missionaries, in completing the Bankor Hill monument, and in securing that Thanksgiving Day should be simultaneously

observed in all the states. She published nearly twenty works, including poems, cookery books, books of poetical extracts, and novels. Her most important work is Woman's Record: or Sketches of Distinguished Women (3d ed. 1869). She died 30th April 1879.—Her sou, Horatio, born 3d May 1817, in 1837 graduated at Harvard, and was appointed ethnologist to the United States Pacific exploring expedition. He prepared the valuable expedition report on Ethnography and Philology (1846), and has published immerous memoirs and works on kindred subjects, including Indian Migrations as evidenced by Language (1883), The Iroquois Book of Rites (1883), a Report on the Blackfoot Tribes, presented to the British Association in 1885, and his introductory address, delivered as president of the Anthropological Section of the American Association in 1886, on The Origin of Languages and the Antiquity of Speaking Man.

Haleb. See ALEPPO.

Hales, Alexander of. Sec Alexander of Hales.

Hales, John, the 'Ever-memorable,' was born at Bath in 1584, and was educated in 'grammar learning' in his native city. At thirteen he entered Corpus Christi College, Oxford, took his degree in July 1603, and obtained a fellowship at Merton College in 1605 as 'a person of learning above his age and standing.' Wood tells us ing above his age and standing. Wood tells us of his extraordinary subtlety in philosophical disputation, of his eloquence, and of his unusual knowledge of the Greek tongue, which contributed greatly to Sir Henry Savile's edition of St Chrysostom, and procured for himself in 1612 the chair of Greek in his university. Next year he delivored the funeral oration of Sir Thomas Bodley, and was admitted a Fellow of Eton. In 1618 he went to the Hague as chaplain to the ambassador, Sir Dudley Carleton, for whom he made a report of the proceedings at the famous synod of Dort, in a very interesting series of letters. Here the passion and contentious zeal of extreme orthodoxy seem to have convinced him that neither side possessed the monopoly of truth, and indeed that it is a hopeless attempt to express spiritual truth within precise dogmatic definitions. According to his friend Farindon, 'there he bid John Calvin good-night, as he often told.' Early in 1619 he returned to Eton to devote himself to continuous study, varied only by a journey to London once a year. Yet he was no melancholy recluse, but delighted in the conversation of such Science, a Children with four Earlies Science. friends as Chillingworth, Lord Falkland, Savile, and Sir Henry Wotton, as well as Ben Jonson, Snekling, and other London wits. His too liberal Tract concerning Schism and Schismatics brought him under the displeasure of Laud, who was, however, satisfied after a personal conference and an appologetic letter, and appointed him to a canonry apologetic letter, and appointed in to a canony at Windsor, the only preferment Hales could ever be induced to accept. No doubt he allowed himself to be persuaded, because he loved peace better than argument; and Peter Heylin's account of how Hales told him that Laud's logic had 'ferreted him from one hole to another' need not be taken too literally, being, as Hallam says, Indicrous, considering the relative abilities of the two men. The Puritan supremacy deprived him of his office, and reduced him to great want, which Andrew Marvell said well was 'not one of the least ignominies of that age.' He was forced to dispose of his line collection of books, which must have been the keenest trial to his scholar's heart. He died at Eton, 19th May 1656.

Hales is a rare example of a profound student

Hales is a rare example of a profound student without pedantry, a ripe theologian with an altogether untheological clearness of mind and direct-

ness of phrase. His conviction that dogmatic differences do not really affect religion, and his zeal for freedom of spirit rather than rigidity of form, belong not to his own time, but were qualities well becoming the dear friend of Falkland and Chillingworth. The genial sweetness of his temper and the humble modesty of his bearing fitted well with a singularly devout but unol-trusive piety, and help to account for the un-wonted glow of warmth in the accounts of him by Clarendon, Pearson, Marvell, and Stillingleet alike. Anbrey's false imputation of Socinianship bas done much wrong to the memory of one of the most loyal although enlightened sons of the Church of England; but we have to thank his rambling pen for a glimpse of the gentle and cheerful little scholar not a year before his death, 'in a kind of violet-coloured cloth gown with buttons and loops,' the *Imitation* in his hand. His picture is one of the finest in the gallery of Clarendon, whose own words best help to explain the large tolerance of his temper and his broad conception of Christianity: 'He had, whether from his natural temper and constitution, or from his long retirement from and constitution, or from his long retirement from all crowds, or from his profound judgment and discerning sphit, contracted some opinions which were not received, nor by him published, except in private discourses, and then rather upon occasion of dispute than of positive opinion; and he would often say his opinions, he was sure, did him no harm, but he was far from being confident that they might not do others harm, who entertained thour and might entertain other results from them thein, and might entertain other results from them than he did; and therefore he was very reserved in communicating what he thought himself in those points in which he differed from what was received.

'Nothing troubled him more than the brawls which were grown from religion; and he therefore exceedingly detested the tyranny of the Church of Rome, more for their imposing uncharitably upon the consciences of other men than for the errors in their own opinions; and would often say that he would renounce the religion of the Church of England to-morrow if it obliged him to believe that any other Christians should be danned; and that nobody would conclude another man to be danned who did not wish him so.'

His friend Anthony Farindon (1598-1658) undertook to collect his writings, and write a memoir, but died before hus task was completed. In a letter to his publisher he says, 'I am like Mr Hales in this, which was one of his defeats, not to pen anything till I must needa.' And indeed all Hales's writings, valuable as they are, are occasional and unsystematic in form. The Golden Remains of the Ever-memorable Mr John Hales of Elon College were at length published in 1659 under the care of Pearson, who prefixed not a Life but an Epistle to the Reador, containing a most enlogistic character of his author. This edition was reprinted in 1673 and 1688, and in 1677 a new volume gave several additional tracts. The best edition is that issued in three small volumes by the Fonlis Press at Glasgow in 1765, edited by Sir David Dalrymple, afterwards a Scottish judge with the title of Lord Hailes. See chap. 4, vol. 1, of Tulloch's Rational Theology in England in the 17th Century (1872).

Hales, Stephen, natural philosopher, was born at Beckesbourn, Kent, 7th September 1677. He entered Bene't (now Corpus Christi) College, Cambridge, in 1696, was elected Fellow in 1702, and having taken holy orders was presented about 1710 to the perpetual curacy of Teddington, in Middlesex, where he died, 4th January 1761. His first important publication was Vegetable Staticks, or Experiments on the Sap of Vegetables (1727), which may be regarded as the starting-point of our true knowledge of vegetable physiology. In Humastaticks (1733), a second part of this work treating

of the circulation of the blood, Hales gives results obtained by experimental methods of investigation like those now in use in studying physiology. Besides other independent works, including The Means of Dissolving the Stone in the Bladder, he contributed numerous memoirs to the Philosophical Transactions on Ventilation, on Electricity, on the Analysis of Air, &c. His ventilating-machines were introduced into the Loudon prisons. His improvements in the mode of collecting gases did much to facilitate the subsequent labours of Black, Priestley, and Lavoisier. He also invented machines for distilling sea-water, preserving meat, &c.

Halesowen, a market-town of Worcestershire, on the river Stour, 7½ miles WSW. of Birmingham. Its people are nail-makers and mannfacturers of small ironwares. One mile to the south-east lie the rnins of the Premonstratensian abbey founded by King John. Sheustone (1714-63), a native of the place, carried on his landscape-gardening at the Leasowes, a mile distant from Halesowen. His tomb is in the church. Pop. 3338.

Halévy, Jacques François Fromental Élie, composer, was born of Jewish family at Paris, 27th May 1799. He studied at the Conservatoire there under Berton and Cherubini, after wards at Rome, devoting himself especially to the old church music of Italy, and on his return strove in vain to put on the hoards his operas, La Bohémienne and Pygmalion. His next operas, L'Artisan (1827) and Le Roi et le Bâtelier (1828), were failures, but Clari (1828), in which Malibran took the chief rôle, and the comic opera, Le Dilettante a'Avignon (1829), were successes, and ere long Halévy found himself the composer of the day, and his masterpiece, La Juive (1835), carried his name over Europe. His next hest work is the comic opera, L'Eclair (1835). Later works represented with greater or less success are Guido et Ginévra, Les Treize, Le Drapier, Le Guitarréro, La Reine de Chypre, Les Mousquetaivs de la Reine, Le Val d'Andorre, La Tempête, and Dane de Pique, the last two with the libretto by Scribe. Halévy died at Nice, 17th March 1862. Among his pupils were Gounod, Victor Massé, Bazin, and George Bizet, who married his daughter. He worthily carried on the succession of the great school of French opera, midway between Chernbini and Meyerbeer—sharing the perfect mastery of resource of the former and the tendency of the latter to subordinate everything to effect, and instinctively avoiding the enumonplace or vulgar. Admitted to the Academy of Fine Arts in 1846, he became perpetual sceretary in 1854. His étoges were collected as Souvenirs et Portraits (1863), and Derniers Souvenirs et Portraits (1863). His Life was written by his brother Léon (2d ed. 1863) and by Pougin (1865).

His Life was written by his brother Léon (2d ed. 1863) and by Pougin (1865).

Léon Halévy, brother of the foregoing, was born at Paris, 14th January 1802, studied law, filled a chair in the Polytechnic School, and afterwards, from 1837 to 1853, a post in the Ministry of Instruction, which he resigned to give himself entirely to literature. He died at St Germain-en-Laye, 3d September 1883. He wrote the introduction to Saint Simon's Opinions litteraires, philosophiques, et industrielles (1825), and afterwards, on his own account, historics, poetry, fables, novels, dramatic poems, and translations of Macbeth, Clavigo, &c. His best books are Résumé de l'Histoire des Juifs (1827-28), Poésics Européennes (1837), and La Crèce Tragique (1845-61).

Ludovic Halévy, son of Léon, was born at Paris, let Lendovic Paris (1861) and 1861 leaves constants.

LUDOVIC HALEVY, son of Léon, was born at Paris, 1st January 1834, and in 1861 became secretary to the Corps Législatif. He first made himself known as the writer of the librettos to Offenbach's burlesques (partly in collaboration with Meilhac):

24.

514

Orphée aux Enfers (1861), La belle Hélène (1865), La Vie Parisionne (1866), La Grande-duchesse de Gérolstein (1867), Les Brigands (1870). He wrote besides a large number of vaudevilles and comedies, besides a large number of Vautevines and comedies, among them La Périchole (1868), Froufrou (1869), Tricoche et Cucolet (1872), Le Mari de la Débutante (1878), and La petite Mère (1880). His Madane et Monsieur Cardinal (1873) and Les petits Cardinal (1880) are delightfully humonous sketches of (1880) are delightfully humonous sketches of Parisian theatrical life; his L'Invasion (1872) was a collection of personal recollections of the war. In 1882 he startled the world with his charming idyllic story L'Abbé Constantin, which has been well followed, but not in the same vein, by Criquette (1883) and Denx Muriages (1883). Halevy was (1883) and Donx Mariages (1883). admitted to the Academy in 1886.

Halévy, Joseph, an eminent French orientalist and traveller, was born 15th December 1827, at Adrianople. In 1868 he travelled in northern Abyssinia; next he traversed (1869-70) Yemen in quest of Sabrau inscriptions for the French Academy—one of the most fruitful journeys ever made by an archieologist. No European face had been seen in the Jowf since the soldiers of Elins (fallus had visited it in the year 24 A.D., and Halevy travelled as far north as Bled Nedjran Halévy travelled as far north as Bled Nedjran (18° N. lat.), and was able to collect as many as 860 inscriptions. His chief books are Mission archéologique dans le Yemen (1872), Essai sur la Langue Aguou, le Dialect des Falachas (1873), Voyage au Nedfran (1873), Études Berbères (1873), Mélanges d'Épigraphie et d'Archéologie Sémitiques (1874), Études Sabéennes (1875), Études sur la Syllabaire Cunciforme (1876), Recherches critiques sur l'Origine de la Civilisation Bahylonienne (1877), Essai sur les Inscriptions du Sufa (1882), and Mélanges de Critique et d'Histoire relatifs anx Peuples Sémitiques (1883).

Half-blood, related through one parent only. When two persons have the same father, but not the same mother, they are called brothers or sisters consanguinean; when they have the same mother only, they are called brothers and sisters uterine. See Succession.

Half-pay is an allowance given in the British army and navy to commissioned officers who are not actively employed, and corresponds to the French demi-solde.

In the navy, officers are appointed to a ship to serve for the period during which she is in commission. At the end of that period, or if promoted or otherwise removed from her, they are placed on half-pay until again called upon to serve. As the number of naval officers always exceeds that of the appointments open to them, there are at all times many on the non-effective list receiving about 60 per cent. of the pay of their rank.

In the army, permanent half-pay, first granted in 1698, was abolished in 1884, retired pay being substituted for it. Under the provisions of the noyal warrant of 1887, lientenant-colonels who have held cammand for four years are placed on temporary half-pay (11s. a day) until promoted. Majors of seven years' regimental, or five years' regimental, or five years' at all severing in the really may drive proportion to stall service in that rank may claim promotion to half-pay lioutenant coloncloies, and these or any officers of lower rank may be placed on the half-pay of their rank while incapacitated through illhealth, or as a punishment for inefficiency. Halfpay officers are oligible for any employment suited to their rank, but are not borne on the strength of any regiment.

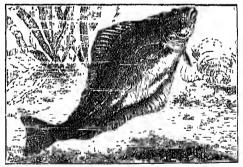
Secondard officers are those who are extra-regi-mentally employed, but whose names remain on the rolls of their regiments, additional officers being appointed in their places. On the termina-tion of such employment they are absorbed into

the regiment as soon as vacancies occur in their proper rank.

Officers on retired pay are liable to be called upon to serve in case of national peril or great emergeney.

Haliburton, Thomas Chandler, colonial judge and anthor, was been at Windsor, Nova Scotia, in 1796, was called to the bar in 1820, and became a member of the House of Assembly. He was raised to the bench as chief-justice of the common pleas in 1829, and in 1840 became judge of the supreme court. In 1842 he retired from the banch and took up his residence in England. In bench, and took up his residence in England. In 1858 he received the degree of D.C.L. from the university of Oxford, and in 1859 entered parliament as Conservative member for Launceston. He is best known as the author of Sam Slick, the name of a Yankee clockmaker and pedlar, a sort of American Sam Weller, whose quaint drollery, of American Sam Weller, whose quaint drollery, unsophisticated wit, knowledge of human nature, and aptitude in the use of what he calls 'soft sawder' have given him a fair chance of immortality. The series of newspaper sketches in which this character had first been introduced was published in 1837 as The Clockmaker, or Sayings and Doings of Samuel Slick of Slackville; two later series followed in 1838 and 1840, and Sayings and Doings of Samuel Slick of Slickville; two later series followed in 1838 and 1840, and The Attaché, or Sam Slick in England, in 1843. Haliburtou's other works include 1 Historical and Statistical Account of Nova Scotia; Bubbles of Umada; The Old Judge, or Life in a Colony; Letter-bag of the Great Western; Yunkee Stories, and Traits of American Humour; Nature and Human Nature; Rule and Misrule of the English in America; and Wise Saws and Madern Instances, He died at Isleworth, 27th Anenst 1865. He died at Isleworth, 27th August 1865.

Malibut, or Hollbur (Hippoglossus vulgaris), the largest of all the flat-fish (Pleuronectidae), in form more clongated than the flounder or the turbot, the eyes on the right side, the upper surface smooth, and covered with small soft oval scales.



Halibut (Hippoglossus vulyaris).

the colour brownish, marbled all over with darker markings, the under surface smooth and white. The halibut, though esteemed for the table, is not to be compared in quality with the turbot; its flesh, though white and firm, is dry and of little flavour. It is found from the coasts of Spitzbergen to Iceland, off Newfoundland, &c., and from Finland and Scandinavia to the British and French coasts, but is rare in the Channel. It is alumdant off the Orkneys, especially in oddies where tides meet. It is also found on the coasts of New England, New York, California, and Kauchatka. It is a lish of great value to the Greenlanders, who preserve it for winter use by cutting it into long strips and drying it in the air. Oil is obtained from it in considerable quantity, chiefly from the bones. It attains a great size; specimens have been caught in Europe weigbing at least 500 lb., and one caught in Iceland was little short of 20 feet long.

Halicarnassus (originally called Zephyria), a Greek city of Caria in Asia Minor, situated on the Ceramic Gulf. It was founded by Dorian colonists from Treezen, and defended by several citadels, one of which, Salmacis, was deemed impregnable. Early in its history it became one of the cities of the so-called Dorian Hexapolis, from which confederacy, however, it was eventually excluded. When the Pensian power spread westward, Halicarnassus readily submitted to the dominion of the conquerors. During this period, however, about 500 B.C., a domestic tyrant, Lygdamis, rose to supreme power as a vassal of Persia; and his descendants, without forfeiting the Greek character, or ceasing to enlitivate the Greek literature and arts, gradually extended their sway over all Caria. Amongst them was Mansolns, whose wife and sister Artemisia, to commemorate him After his death (353), erected the magnificent Mausolenn (q.v.) which was accounted one of the seven wonders of the world. It was under this king that the city attained its highest degree of splendour and prosperity. About twenty years later Alexander the Great destroyed the city by fire; but the inhabitants took refuge in the citadel, which successfully resisted his arms. The city was afterwards which the city has a successfully resisted his arms. afterwards rebuilt, but it never recovered its ancient importance or prospecity. In the days of the Roman empire it had sunk into comparative insignificance. Halicarnassus was the birthplace of the Greek historians Herodotas and Dionysius. The site of historians Herodotas and Dionysius. The sit the city is occupied by the modern Badrun. account of the excavations conducted there will be found in Newton's Discoveries at Halicarnassus (1862-63).

Halicore. See Dugong.

Halicz, a town of Austria, in the crownland of Galicia, is situated on the Dnicster, 69 miles SSE. of Lemberg by rail. On a hill in the vicinity are the ruins of the once strongly fortified castle of Halicz, built in the 12th century, and the residence of the rulers of what was formerly the grand principality and kingdom of Halicz. From this word the name Galicia (q.v.) is derived. Pop. 3464.

Halidon Hill, an eminence in Northumberland, 2 miles NW. of Berwick, overloaking the Tweed, was the scene of a bloody conflict between the English and Scots, 19th July 1333, in which the latter were defeated, upwards of 10,000 of them (according to some authorities, 14,000) being left on the field.

Hatifax, a thriving market town, municipal, parliamentary, and county borough, in the West Riding of Yorkshire, is situated on the river Hehble, a feeder of the Calder, on the slope of an eminence, and is almost wholly surrounded by hills. It is 43 miles SW. of York, and 194 miles NNW. of London. Dr Whitaker derives its name from the four ways travelled by pilgrims converging towards the parish church, called Holy Ways; fax (as in Caofax) being Norman-French for 'forks' or ways. A more popular derivation is that it means 'Holy Face,' from a representation of the head or face of John the Baptist having been at a remote period kept in a chapel where now stands the parish church of St John the Baptist. Its situation is pleasing, and its general appearance handsome; while its ample supply of water-power and of coal, its facilities for transport both by water and by leading lines of railway, and its position in proximity to many of the great towns of the north of England contribute materially to its manufacturing and commercial importance. Some Flemish artisans had settled here in the reign of Henry VII. The

ecclesiastical architecture of Halifax strikes every visitor. The parish church of St John, restored in 1879, is a line specimen of Perpendicular Cothic; 'All Souls,' built at the expense of Edward Akroyd from designs by Sir G. G. Scott, is one of the best and most elaborate of all the churches of which he is the architect. The 'Square Church,' helonging to the Congregational body, was erected in 1853, and there are in all about forty Nonconformist churches. The town-hall, opened by the Prince of Wales in 1863, is a very ornate Remaissance edifice, from designs by Sir Charles Barry; the new post-office was opened in 1887. Another important building is the Piece Hall, erected in 1779 for the reception and sale of manufactured goods; it was presented to the corporation by Sir S. Ibbetson in 1868, and is now used as a Market Hall. Among the numerous public and private educational institutions of Halifax are the Heath grammar-school, founded in 1585, and the Blue-coat School. The school-board has the control of fully two-thirds of the school-children. The Crossley and Porter Orphan Home and School was lmilt by the Crossley brothers at a great cost, and has an endowment of £135,894. In 1887 Mr J. Porter of Manchester (formerly of Halifax) augmented the endowment fund by a gift of £30,000. Halifax has four parks—Savile, Shrogg's, Akroyd, with free library, museum, and art-gallery, and the People's Park. The last, the gift of the late Sir F. Crossley (q.v.), is tastefully laid out from designs by Sir Joseph Paxton, and cost about £40,000. There are two theatres (one dating from 1888). The Public Libraries Act has been adopted; there are also a Mechanics' Institute and the Dean Clongh Institute erected by the Crossleys for their work-people. There is a strong co-operative society (Halifax Industrial), with central stores erected in 1860 at a cost of £17,400, and twenty-gight breach stores

eight branch stores.

The worsted and carpet trades are the staple industries. Crossley's cappet-works, the largest in the world, employ more than 5000 hands. The manufactured goods, other than carpets, are chiefly worsted coatings, fancy dress goods, damasks, and merinos. Cotton fabrics and woolcards are manufactured, while dyeing and hosiery trades are on an extensive scale. There is also some trade in corn; iron, chemicals, boots, and mill-machinery are manufactured, and freestone is quarried. The water-works, which are very complete, have cost the corporation about £675,000. Pop. (1851) 33,582; (1871) 65,510; (1881) 73,633; (1889) 82,000. The borough since 1832 has re-

turned two members to parliament.

A strange old local law, relinquished in 1650, known as the Halifax Gibbet Law, was enacted here at an early period of the woollen mannfacture, for the protection of the mannfactures against the thievish propensities of persons who stule the cloth when stretched all night on racks or wooden frames, called tenters, to dry. The Gibbet Law provided that all persons within a certain circuit, who had stolen property of or above the value of 13½d., were to be tried by the frith-burghers within the liberty; and, if found guilty, they were handed over to the magistrates for punishment, and were excented on the first market-day following by means of an instrument similar to the guillotine. See Watson's History of Halifax (1775; ed. by Leyland, 1869).

Halifax, the capital of Nova Scotia and the principal Atlantic scaport of Canada, is situated on the eastern or Atlantic coast of Nova Scotia, in 44° 39′ N. lat. and 63° 37′ W. long. It is the nearest to Great Britain of any city on the American continent, heing but 2178 miles from Cape Clear. Previous to the founding of the city, the magnificent sheet of water that constitutes its

harbour was called by the Indiana Chebueto, signifying the greatest of havens—a name not in-appropriate for what is one of the finest harbours in the world. It is easily accessible at all seasons of the year, at all times of the tide, by ships of any tonnage; and is capable of affording safe anchorage to the whole British navy. The fact that it was selected as the American rendezvous of the illstarred expedition of D'Anville against the British ealonies in America in 1746 led to a demand on the part of those colonies that a place of such strategie importance should no longer be unoccupied by imperial troops. Their demand was ably supported by Lord Halifax, and accordingly an expedition was fitted out in 1749, under command of the Hon. Edward Cornwallis, which founded the city and gave to it the name of its English patron. at once became the capital of the province, and the principal naval and military station of Great Britain in America, and has remained so ever since. It is garrisoned by imperial troops, and is strongly fortilied—its supposed impregnability seeming for it the appellation of 'the Cronstadt of America.' The dockyard, covering 14 acres, is one of the finest in the British colonies. Down to the close of the Napoleonic wars. Halifax was little more than a military and naval entrepot; but of late years it has assumed more and more the character of a has assumed more and more the emerative of a commercial city. It is built on the western side of the harbour, and extends along it alont two miles and a half. The streets are well laid out, and are lighted by electricity. The commercial portion of the city is built principally of freestone. Its watersupply is excellent, and statistics show it to be one of the healthiest cities in America. It is the of the healthiest cities in America. It is the residence of the Roman Catholic archbishop of residence of the Roman Catholic archinstop of Inalifax (whose archiepiscopal see includes Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland) and of the Church of England bishop of Neva Scotia. It is also the seat of Dalhousic University and of a large number of other educational institutions, including a school for the blind, and one for the deaf and dnumb. In common with the rest of the province, its public schools are five and attandance at them between schools are free, and attendance at them between cortain ages is compulsory. It is the castern or Atlantic terminus of the Intercolonial Railway of Canada and of the Canadian Pacific Railway, and Canada and of the Canadian Pacific Railway, and has lines of stramers connecting it with London, Liverpool, New York, Boston, Bermuda, the West Indies, St Piorre, and both the cast and west coasts of Newfoundland. It has also the largest graving-dock (580 by 102 feet) in America, constructed in 1880-89, at a cost of \$1,000,000, and capable of receiving the largest ship affoat. The proximity of Halifax to the coallields of Pietou and Capie Breton and its extensive wharf accommodation make it a favourite coaling station for steamers navigating the North Atlantic. Its populasteamers navigating the North Atlantic. Its population in 1881 was 36,100; its estimated population in 1889 was 41,000. Dartmonth, on the opposite shore of the harhour—practically a suburb of Halifax—has a population of 5000. For the year ording 20th from 1990 the continuous ending 30th June 1889 the foreign trade of the part amounted to \$11,710,407. During the same period the total tennage of vessels entering the harbour was 902,921.

Halifax, Charles Montague, Earl of, poet and statesman, who owed his introduction to political power to his facile skill in verse-making, was the nephow of the famous Parliamentary general, the Earl of Manchester, and was born at Horton, in Northamptonshire, 16th April 1661. He was educated at Westminster School and Trimity, College, Cambridge, where he formed a life-long friendship with Newton. His most notable poetical achievement was a parody on Dryden's Hind and Panther, entitled The Town and

Country Mouse (1687), of which he was joint author with Matthew Prior; but his poetry would hardly have made his name remembered in the 19th century. In the following year, through the influence of the Earl of Dorset, he became member for Malden in the Convention Parliament, and soon developed a decided talent for financial business. Retaining his seat in William III.'s first parliament, he was appointed in 1691 a Commissioner of the Treasury. On the 15th December of the following year he proposed, in the Honse of Commons, to raise a million sterling by way of loan. William required money for his wais; the moneyed classes were tired of bubble companies, and knew not where to invest safely; and the landowners were weary of heavy taxation: so the National Debt was established. In the spring of 1694 money was again wanted, and Montague supplied it by originating a national bank, a scheme for which had been laid before government by William Paterson, three years before. The capital was to be £1,200,000, and the shareholders were to be called the Governor and Company of the Bank of England. As a reward for this service Montague was appointed Chancellor of the Exchequer in 1694. His next work was the receinage in 1695, which he carried out successfully, appointing Newton warden of the Mint, and raising a tax on windows to pay the expense, instead of the olmoxious impost called hearth money. At this crisis too he first introduced exchequer bills. On Godolphin's resignation in 1697 he became premier, but his arrogance and vanity soon made premier, but his arrogance and vanity soon made him unpopular, and on the accession to power of the Teries in 1699 he was obliged to accept the auditorship of the exchequer, and withdraw from the Commons as Baron Halifax. He was impeached before the House of Lords for breach of trust in 1701, and again in 1703, but the proceedings fell to the ground. During the whole of Anne's reign Halifax remained out of office, but was active in promoting the union with Scotland, and the Hanoverian succession. On the queen's death he was appointed a member of the council of regency, and on George L's arrival became an earl and prime-minister. His rule lasted only nine months, being terminated by death on 19th May 1715. being terminated by death on 19th May 1715.

Halifax, George Savile, Marquis of, statesman, was born about 1630. For the share he took in bringing about the Restoration he was created a viscount in 1668. In 1675 he opposed Danby's Test Bill, and in 1679 by a display of extraordinary oratory precured the rejection of the Exclusion Bill. Three years later he was created a marquis, and made Lord Privy Scal. On the accession of James II. he became president of the council, but was dismissed in 1685 for his opposition to the repeal of the Test Act and the Habeas Corpus Act. He was one of the three commissioners appointed by James II. to treat with William of Orango after he landed in England. After the flight of James, Halifax tendered his allegiance to William III., and under him resumed the office of Lord Privy Scal; but, subsequently joining the opposition, he resigned his post in 1689. He died 20th April 1695. Shaftesbury was the sole rival as an orator of this

Johann of piercing wit and pregnant thought, Endued by nature and by learning taught To move assemblies.—Daydun's Absalom and Achitophel.

As a minister he was a failure, owing to his frequent changes of side; yet he was not a fielde party-man, but rather a philosophic statesman, who, in order to serve his country, was compelled by the excesses of party to adopt this course—such at least is the defence he lays down in his On the Character of a Trimmér. His Miscellanics were published in 1700. The poot-musician Henry Carey (q.v.) is believed to have been his natural son.

Haliotis, a genus of gasteropodous molluses, of the family Haliotidæ, order Prosobranchiata; shell widely open, ear-shaped, pierced on the onter margin by a series of holes which are closed in the comise of growth after ceasing to be of use in containing the pallial folds. The shell, on account of its beautifully iridescent Nacre (q.v.), is much used for the purposes of ornament. In some parts of Italy it is called Venus's ear; it is the 'mother-of-pearl' of old English writers, and the 'ormer' (contracted from ordita do mer) of the French. The animal itself, in a living state, exhibits great beauty of colours. It inhabits the littoral zone, adhering to rocks like the limpet; one Japanese species, however, is found in deep water. Several species are used for food in different parts of the world. The genus has a wide distribution, being found in every part of the ocean from the Channel Islands southwards. Seventy-five recent and four fossil species, commencing in the Miocene period, are known.

Halitherium. See Dugong.

Hall, the large principal apartment of the castles and mansions of the middle ages. The hall is of very ancient origin. The earliest Saxon buildings we have any record of are the palaces of the kings, and these seem to have consisted of one large hall, in which the king, his contriers or 'hearth-men,' and all his retainers dwelt together, eating at the same table, and sitting round the same fire; and one other chamber, in which the king and his hearth-men slept, while his retainers slept in the hall. In the Norman keep the hall occupied the whole of the first floor—the private apartment of the lord of the castle being on the floor above. In the 12th century halls of a more commodions kind came to he erected in the contryards of the castles, with the private apartments at one end and the kitchen offices at the other. The same arrangement prevailed, with slight modifications, during the 12th and 13th centuries. In the 14th and 15th centuries, when England was more settled and prosperous, and manners more refined, munerous apartments became necessary. The hall, however, still retained its place as the chief apartment. In it the king or the lord of the manor gave audience, administered justice, received and entertained his retainers and guests, and performed all the public acts of feudal life.

At one end of the hall was a raised platform or dais, on which the table of the lord of the manor was placed, and where his more honoured guests sat along with him. This end of the hall was usually lighted with large oriel windows, and communicated with a building which contained the lord's solar, or bedroom and parlour, on the upper floor, and the wine-cellar below. The retainers sat at a table which ran along the lower part of the hall. This part was not always in the cleanest and sweetest condition, and hence it received the name of 'the maish.' The entrance porch was at the lower end of the hall, where also a passage was cut off by a screen. This passage gave access to the kitchen, pantry, and buttery, and above the passage a gallery for musicians was frequently constructed. Survivals of such medieval dining-halls may be found in the Oxford and Cambridge colleges, with their high tables, portraits, stained glass, &c., as also in the halls of the Inns of Court and of some of the London guilds.

The hall partook of the style of architecture prevailing at the time when it was built, and being a large and important apartment was generally ornamental in its character. The roofs especially were very carefully and elegantly constructed, as many still remaining show. The hall was essentially a part of feudal architecture. When that system gave way, the large common halls were

abandoned and private dining-rooms substituted. Many ald ones, however, still remain; but their use is changed. The hall of the king's palace, now called 'Westminster Hall,' built by William Rufus, and restored by Richard II., is the finest example in England, being 300 feet long and 100 feet broad. See also MUNICIPAL ARCHITECTURE.

HALL

Hall, or SCHWABISCH-HALL, a town of Würtemberg, is beautifully situated in the deep valley of the Kocher, 33 miles by rail E, by S, of Heilbronn. Like other places in whose names the word Hall or Salz occurs, Hall has considerable saltworks, the brine being obtained from Wilhelmsglick, 5 miles distant, and producing annually nearly 80,000 cwt. of salt. There are also cottonspinning and weaving, silk and machine mannfactures, and tanneries. The Gothic church of St Michael (1427-1525) has excellent wood-carvings. In 1276 Hall was made a free imperial town; it had enjoyed since 1228 the right of minting money; here were coined the first silver heller (haller) or farthings. In 1802 it was added to Würtemberg. Pop. 9125.

Hall, a town of Austria, in Tyrol, is situated on the Inn, 6 miles by rail E, of Innsbruck. The parish church contains a monument to Speckbacher, the Tyrolese patriot of 1809. About 7 miles north of the town is the Salzberg, from the mines in which salt bline is conveyed to the pans of Hall in wooden pipes. Here 150,000 cwt. of salt are produced annually. Hall received town rights in 1303. It is a health-resort. Pop. 5456.

Hall, Basil, writer of travels and miscellaneous works, was born in Edinburgh, 31st December 1788. He was the son of Sir James Hall of Dunglass, baronet (1761-1832), the founder of experimental geology (see Geology), also distinguished as a chemist and as author of a work on Gothic architecture. Basil entered the navy in 1802, and became post-captain in 1817. When Lord Amherst was sent on a mission to the court of Peking in 1816, Hall commanded a sloop in the naval escort, and visited some places along the western coast of the Corea which were little known to Europeaus. The chief results of his explorations were published in A Voyage of Discovery to Corea and the Great Loo-Choo Islands (1818), a book which took the popular faucy. After this he wrote Extracts from a Journal written on the Coast of Chili, Peru, and Mexico in 1820-23; Travels in North America in 1827-23 (a work that was violently assailed by the American press); and, also popular, Fragments of Voyages and Travels (9 vols. 1831-40). Hainfeld (1836), a semi-romance, and Patchwork (1841), a collection of tales and sketches, also came from his pen. He was a Fellow of the Royal Societies of London and Edinburgh, and a member of the Astronomical Society of London, and the author of various articles in the scientific journals of the day. He died insanc in Haslar Hospital, Gosport, 11th September 1844.

Hall, Charles Francis, Arctic explorer, born in Rochester, New Hampshire, in 1821, was successively a blacksmith, journalist, stationer, and engraver, and, becoming interested in the fate of the Franklin expedition, devoted his leisure to gathering information about Arctic America. He made two search expeditions, in 1860-62 and 1864-69, living alone among the leskimo, and bringing back some relics and the bones of our of Franklin's company; and in 1871 he sailed in command of the government ship Polaris, on an 'expedition to the North Pole.' He took his vessel for 250 miles up the channel leading from Smith's Sound, and on 29th August reached 32° 16' N.—at that date the highest northern latitude ever reached;

518 HALL

then turning southward, he went into winter-quarters at Thank God Harbour, Greenland (81° 38' N.). Here, on his return from a sledge expedition to the north, he was taken suddenly ill, and died 8th November 1871; over his grave a grateful epitaph was placed by the British polar expedition in 1876. His companions left Thank God Harbour in August 1872. In October, through the ice-anchor slipping, nineteen men were left with stores on a floe, and only after sevene sufferings were they rescued by a sealer off the Labrador coast in the following April. The leaking Polaris was heached on Littleton's Island, and in June 1873 the party set out for Upernivik in two boats which they had constructed; they were ultimately picked up by a Dandee whaler near Cape York. The charts published by the expedition are often incorrect and misleading, but among the valuable results of Hall's work were the exploration of the West Greenland channel, and the extension of Greenland and Griunell Land a degree and a half north. Hall published Arctic Researches, and Life among the Eaguinanae (1864); and from his papers largely was compiled the Narrative of the Second Arctic Expedition (Washington, 1879).

Hall, Chester More, a gentleman of Essex who in 1733 anticipated Dolloud in the invention of the achromatic Telescope (q.v.).

Mall, Christopher Newman, Congregational minister, was the son of John Vine Hall, anthor of The Sinner's Friend, and was born at Maidstone on 22d May 1816. Having graduated at London University, he preached in Hull from 1842 to 1854. In this latter year he removed to London as minister of Surrey Chapel, Lambeth, which was originally founded by the Rev. Rowland Hill. This chapel is now called Christchurch. He enjoys wide repute as an eloquent and pepular preacher, and is the anthor of several works of a devotional character, some of which, as Come to Jesus, The Call of the Master, and The Man Christ Jesus, have had an enormous sale. He has also written Antidote to Fear, Meditations on the Lord's Prayer, Pilgrim Songs in Cloud and Sunshine, &c.

If all, or If alle. Edward, English historian, was born in London in 1499, of a family settled in Shropshire, but of German descent. He was educated at Eton, became scholar of King's College, Cambridge, in 1514, and junior Fellow in due course, next studied at Gray's lun, and heard some of the lectures of Wolsey's foundation at Oxford. He became one of the common serjeants and undersherif' of the city of London, and afterwards a judge in the sheriff-court, and died in 1547, in the same year with Henry VIII. Next year his history was printed from his manuscript by Richard Grafton, under the title, The Union of the Two Noble Families of Lancaster and Yorke. It was composed mostly in his younger years, but was only brought down to 1532; the rest, down to 1546, was completed by Grafton. The exceptionally large number of variations in the copies make this thick black-letter folio something of a bibliographical enriosity.

Hall's work is one of the finest of our early histories, and the stately dignity of its style and reality of its figures had a charm for the dramatic sense of Shakespeare. To the student of the reign of Henry VIII, it is especially valuable as the truthful and intelligent evidence of an eye-witness, and if his account of his king is too uniformly eulogistic, we must remember how inestimably valuable to his legal mind was the present blessing of a settled domestic peace after the bloodshed and distraction of the Roses. Hall loves to describe with detail scenes of pomp and pageantry, such as made splendid the early years of Henry's reign—a taste that

harmonises well with the stately and pompons Latinisms of his English. The best edition is that by Sir Henry Ellis (1809),

Hall, James, Ll.D., geologist, was born at Hall, James, Ll.D., geologist, was born at Hingham, Massachusetts, 12th September 1811, and in 1837 was appointed one of the New York state geologists. His final report on the western part of the state appeared in 1843. Of his other works the chief is his important Palaontology of New York (vols. i.-v. 1847-79); he also contributed to the geological surveys of Iowa, Wisconsin, and Canada, and published nearly 250 separate papers. He is a member of numerous scientific bodies in Europe as well as in America.

Hall, Joseph, bishop and divine, was born 1st July 1574, at Ashby-de-la-Zonch, Leicestershire. He was educated at Emmanuel College, Cambridge, of which he became a Fellow in 1595. Taking orders, be held successively the livings of Halstead and Waltham, in E-sex, and the deanery of Worcester. In 1617 he accompanied James to Scotland to help establish Episcopacy, and in this and the next year was one of the English deputies to the synod of Dort. He was consecrated lishop of Exeter in 1627, and in 1641 was translated to Norwich. The later years of his life were saddened by persecution. He was accused of Paritanism, though he zealously defended Episcopacy, and he incurred the emuity of Archbishop Land. In 1641, having joined the prelates who protested against the validity of all laws passed during their enforced absence from parliament, he was committed to the Tower, and threatened with a prosecution for high-treason, but was set at liberty at the end of seven months, on finding bail for 25000. Shortly after his return to Norwich his revenues were sequestrated and his property pillaged. Thereafter he rented a small farm at Higham, near Norwich, to which he retired in 1647. There he died 8th September 1656. His works, including Contemplations, Christian Meditations, Episcopacy, and Mandus Alter et Idem, a Latin satirical romance of an unknown country in Terra Australis, were edited by the Rev. Josiah Pratt (10 vols. 1808), and by Peter Hall, a descendant (12 vols. 1837-39). His poetical Satires: Firgit demicrana (1597-98) Pope calls 'the best poetry and the truest satire in the English language.' Hallam, however, accuses him of being harsh and ranged, obseure, and ungrammatical. See Life by George Lewis (1886).

Hall, Marshall, physician and physiologist, the son of Robert Hall, who introduced the practice of bleaching cotton with chlorine, was born at Basford, in Nottinghamshire, 18th February 1790. After studying medicine at Edinburgh (1809-14), Paris, Göttingen, and Berlin, he settled at Nottingham in 1817; and practised in London from 1826 until 1853. He died at Brighton, 11th August 1857. Though not the original observer of the phenomena of the reflex action of the spinal system, Hall claims to have been the first to show their independence of sensation, to work out the laws of their causation, and to apply the knowledge of them to the comprehension of nervous discases. His investigations on this subject were published in two papers (1833-37). His name is also associated with a well-known method of restoring suspended respiration (see Respiration, Artheritalla). Besides the above-mentioned papers, he wrote several works on diagnesis (1817), the circulation (1831), The Inverse Ratio between Respiration and Irritability in the Animal Kingdom (1832), and on the nervous system and its diseases, A bibliography will be found in Memoirs of Marshall Hall, by his widow (1861).

Hall, Robert, dissenting preacher and writer, was born at Arnsby, near Leicester, May 2, 1764-

Feeble in body but precocious in intellect, he learned to read before he could speak. He was educated at a Baptist academy at Bristol (1778–81), and at King's College, Aberdeen (1781–85), where he formed an intimate companionship with (Sir James) Mackintosh. Immediately after his graduation he was appointed assistant minister and tutor in the academy at Bristol. Here his eloquent preaching attracted overflowing audiences. As an orator he was fluent, rapid, and impressive, and was liberal, but not heterodox, in his religious views. In consequence of a disagreement with his colleague, he went in 1790 to Cambridge, where by his powerful and vivid eloquence he rose to the highest rank of British pulpit orators. His writings, apart from sermons, are few; the more important are an Apology for the Freedom of the Press (1793) and On Terms of Communion (1815). In 1806 he settled in Leicester; but returned in 1826 to Bristol, where he died February 21, 1831. A complete edition of his works, with a memoir by Dr O. Gregory, and Observations on his Preaching by John Forster, was published at London (6 vols. 1831–33; 11th ed. 1853).

Hall, Samuel Carer, author and editor, fourth son of Colonel Robert Hall, was born at Geneva Barracks, County Waterford, 9th May 1800. Coming to London from Ireland in 1822, he studied law, and became a gallery reporter for the New Times. He established the Amulet (1825), an annual, which he edited for several years; succeeded the poet Campbell as editor of the New Monthly Magazine; was sub-editor of the John Bull; and did other journalistic work before he founded and edited the Art Journal (1839-80), which has done so much to create a public for art. He was a pertinacious and indefatigable worker and skilful compiler, the joint works written and edited by Mr and Mrs S. C. Hall exceeding 500 volumes. Amongst these were Ireland, its Seenery, &e. (illus. 1841-43); The Book of Gems; British Ballads, one of the fine-art books of the century; and Baronial Halls. A testimonial of £1600 was presented to him by friends in 1874, and in 1880 he received a civil-list pension of £150 a year. He died 16th March 1880. During his lifetime he had associated with most of the best men and women of his time, and showed a benevolent and helpful disposition. See his Retrospect of a Long Life (2 vols. 1883), and Mrs Mayo's 'Recollections of Two Old Friends' (Leisure Hour, May 1889).

May 1889).

Mrs S. C. Hall (Anna Maria Fielding), novelist, and wife of the preceding, was born in Dublin on 6th January 1800. She was brought up by her widowed mother at Graige, on the coast of Wexford, and in her fifteenth year came to London, where her education was completed. In 1824 she married Samuel Carter Hall, who encouraged her to write, and was her guide and counsellor in the composition of her tales and novels, which owed much to his pruning and polishing. She possessed, however, a genuine and spontaneous literary gift. Her first work, Sketches of Irish Character (1828), established her reputation. She wrote nine novels, and hundreds of shorter stories, including The Buccancer (1832); Tales of IVoman's Trials (1834); The Outlaw (1835); The French Refugee, a drama, which in 1836 was acted for about fifty nights at the St James's Theatre, London; Uncle Horace (1837); Lights and Shadows of Irish Character (1838); Marian (1839); Midsummer Ere (1843); The Whiteboy (1845), &c. Her Stories of the Irish Peasantry appeared originally in Chambers's Journal. Besides assisting her husband in varions works, and by contributions to the Art Journal, she furnished numerous articles to periodicals, edited the St James's Magazine for a year, and wrote various books for the young. Of these Uncle Sam's Money-box is

one of the best. She assisted in the formation of the Governesses' Benevolent Institution, a hospital for consumptives, and the Nightingale Fund, which resulted in the endowment of a training-school for nurses. Mrs Hall died January 30, 1881.

Hallam, Henry (1777–1859), historian, son of John Hallam, Canon of Windsor and Dean of Bristol, was born at the former town, 9th July 1777. He studied at Eton College with zeal and success (his Latin verses in the Muse Etonenses were esteemed by competent judges among the best in the collection). He matriculated at Christ Church, Oxford, 20th April 1795, and proceeded B.A. 1799, M.A. 1832. The modern system of prizes was not yet in existence, and if he did nothing tangible at the university, it was because there was nothing to be done. Certainly all through he worked strennously. He next read law in chambers in Lincoln's lun, was admitted a member of the Middle Temple, and called to the bar by that society in 1802. His inu elected him a bencher in 1841, a somewhat rare honour for a non-practising barrister, as Hallam from the flist gave himself entirely to literary punsuits. He had a small lut sufficient fortune of his own, whilst his Whig friends in due time gave him various appointments—a commissionership of stamps among the rest. In 1805 he was engaged to write for the Edinburgh Review (Byron's famons satire alludes to him as 'elassic Hallam, much renowned for Greek'), but it was not till he was over forty that he published his first great work. This was his View of Europe during the Middle Ages. It at once gave him a foremost place among English historians. He received in full measure such honours as fall to the lot of successful scholars. He was created a D.C.L., and elected a Fellow of the Royal, the Antiquarian, and many other learned societies at home and abroad. He was also a trustee of the British Museum, in which institution he took a great interest.

His life was almost without external incident. Its course was narrow and retired, yet within it he was both singularly fortunate and unfortunate. He had no money cares, he chose his own path in literature, and its very drudgery was delightful to him. He was fond of travel and of the society of cultivated men, and he enjoyed both. He was universally respected and admired. He had married a daughter of Sir Abraham Elton of Clevedon Court, Sometsetshire, and the marriage was a happy one. He was devotedly attached to his wife and children; but there was some strain of physical weakness in the family. Of many children, only four survived early life. One of them died suddenly at Vienna. He was the Arthur Henry Hallam (1811-34) of In Memoriam. That work, rather than the fragments he left, full of promise as these were, will preserve his name. Hallam felt the loss keenly. He spoke of himself as one 'whose hopes on this side the tombare broken down for ever;' but fate had not exhausted its malice. His wife died in 1840. The younger son, Henry Fitzmanrice Hallam (1824-50), was struck down abroad like his hother. A sister had predeceased him. The father lived on for yet nine years. In the shadowy joys of literature he found some consolation for those deep pangs which learned and unlearned feel with equal anguish. One daughter, wife to Colonel Cator of Pickhurst, in Kent, remained to soothe with pious care his last years. He lived with her till his death, 21st January 1859. He was buried with his wife and children at Clevedon Church, 'in a still and sequestered situation on a bare hill that overhangs the Bristol Channel.' A statuc by M. Theed was erected to him in St Paul's Cathedral in 1862.

Hallam's position as an historian rests upon three great works. (1) View of the State of Europe during

the Middle Ages (2 vols, 1818), the object of which is 'to exhibit in a series of historical dissertations a comprehensive survey of the chief circumstances that can interest a philosophical inquirer during the period usually denominated the middle ages.' Special attention is accordingly given to the modes of government and constitutional laws. (2) The Constitutional History of England from the Accession of Henry VII. to the Death of George II. (2 vols. 1827). The starting-point is so fixed, because Hallam had already discussed the antecedent portion in the eighth chapter of his View of the State of Europa. He did not go further, 'being influenced by unwillingness to excite the prejudices of modern polities.' This did not save him from a savage attack by Southey in the Quarterly Review. Macanlay made the book the subject of a brilliant pauegyric in his well-known Essay. The work has survived both praise and blame. It is still the standard authority for the period over which it extends; the earlier period has been treated by Stubbs; the later, by Sir T. E. May. (3) Introduction to the Literature of Europe in the Fifteenth, Sixteenth, and Seventeenth Centuries (4 vols. 1837-39). This exhibits an even greater range of information than Hallam's other works; but its extent prevented it from being so thorough as they are. The sources are not so original, and it is not of such permanent value as the Constitutional History. Neither extructs nor biographical details are given, but full analyses of the works discussed.

Hallam's scholarship is accurate, his learning is both wide and deep. He is perfectly honest and perfectly disinterested. He is very anxious to find out the truth and impart it to the reader; and his style is clear and correct. He had some defects. He was a Whig of the old school (he was keenly opposed to the first Reform Bill), and disposed to look at everything from a somewhat narrow party point of view. There is a want of colonr and animation about his style, and there is little human interest in his work; he dissects the past, but he does not make it live again for his readers. He is an author 'rather praised than read,' or at least his works are rather consulted by the student than popular with the general reader. Possibly this is the fate he would himself have wished for them.

There is eddly enough no complete Life of Hallam. The best accounts are the obitinary and funeral notices in the Fince, 24th and 31st January 1859, and in the Proceedings of the Royal Society of London (vol. x. p. 12, 1859–60). See also Harriet Martineau's Riographical Sketches. The Remains of Arthur Henry Hallam, with a memoir by his father, appeared in 1834, and a brief notice of Honry Fitzmaurice Hallam was printed soon after his death. Editions, translations, and abridgments of Hallam's works are minierous.

Hallamshire, an ancient manor of the West Riding of Yorkshire, with Shellield for its capital. It now gives name to a parliamentary division.

Halle, a city of Prussian Saxouy, known as Halle an der Saale, to distinguish it from other places of the same name in Germany, is situated on the right bank of the Saale and on several small islands of the river, 20 miles by rail NW. of Leipzig. As an important railway centre, Halle has of late yoars rapidly increased in size, industry, and prosperity. Its famous university was founded in 1694 by Frederick I. of Prussia; after having been suppressed by Napoleon in 1806, and again in 1813, it was re-established in 1815 and incorporated with the university of Wittenberg, which had been dissolved during the war. At first a chiof seat of the pietistic school of theology, Halle subsequently became the headquarters of the rationalistic and critical schools. In 1888 the university was attended by 1501 students, and had 116 professors and lecturers. The Francke Institutions rank amongst

the most important establishments of the place (see FRANCKE). The noteworthy buildings and institutions embrace St Mary's church (1529-54); the Gothic church of St Maurice, dating from the 12th century, with fine wood-carvings and sculptures; the red tower 276 feet high, in the market-place, with a Roland statue in front of it; the town-hall; the remains of the Moritzburg, built in 1484, the aucient residence of the archbishops of Magdelung; a deaconesses' home; a large penitentiary; the medical institutes and clinical hospitals; the agricultural institute; the university library (220,000 vols.); a provincial inuseum; an art collection; and an archivological and other museums. The most important industrial product of Halle is salt, abtained from brine-springs within and near the town, which have been worked from before the 7th century, and still yield about 114,500 cwt. annually. The men employed at the saltsprings, and known as 'Halloren,' are a distinct race, supposed by some to be of Wendish and by others of Celtic descent, who have retained numerons ancient and characteristic peculiarities. The industries next in importance after the salt-manufacture are machine-making, sugar-refining print-ing, brewing, the manufacture of mineral oil, and fruit cultivation. A very active trade is carried on in machines, raw sugar, mineral oil, grain, and flour. Halle is the hirthplace of Handel the com-Pop. (1871) 52,639; (1880) 71,484; (1885) poser.

81,949. Halle, originally a border fortress against the Slavs, became in the 10th century an appanage of the Archbishop of Magdeburg, and by the 12th century was famous as a commercial city. In that and the 13th century Halle was a powerful member of the Hanseatic League, and successfully withstood a fierce siege by the Archbishop of Magdeburg in 1435, but finally fell into his hands in 1478. Terribly impoverished during the Thirty Years' War, it was incorporated with Brandenburg at the peace of Westphalia. See works by Yon Hagen (1866-67), Voss (1874), and Schönermark (1886).

Halle, Adam de la. See Drama.

Hallé, Sir Charles, an eminent planist, was born at Hagen, in Westphalia, 11th April 1819. He stadied first at Darmstadt, and from 1840 at Paris, where his reputation was established by his concerts of classical music. But the revolution of 1848 drove bim to England, and he ultimately settled in Manchester. He and his highly-trained orchestra were ere long familiar to the music lovers of the kingdom from London to Aberdeen. He did unch to raise the popular standard of musical tasto by familiarising the British public with the great masters of classical music. He was made LL.D. of Edinburgh University in 1884, and was knighted in 1888.—LADY HALLE (née Wilhelmine Neruda), violinist, was born at Britun in Moravia, 29th March 1839. An organist's daughter, she made her début at Vienna in 1846, and three years later played first in London at the Philharmonic. She married in 1814 the Swedish musician Normann, and, after his death in 1885, Sir Charles Hallé.

Halleck, Fitz-Greene, an American poet, born at Guilford, Connecticut, July 8, 1790. By his mother he was descended from John Eliot, 'the apostle of the Indians.' He became a clerk in a bank in New York in 1811, and in 1832 the private secretary of John Jacob Astor; in 1849 he retired, on an annuity of \$200 left him by Astor, to his native town, where he spent the remainder of his days, and died November 19, 1867. From his boyhood Halleck wrote verses, and in 1819 he contributed, with Joseph Rodman Drake, a series of humorous satirical papers in verse to

the New York Evening Post. In the same year he published his longest poem, Fanny (2d ed., enlarged, 1821), a satire on the literatme, fashions, and politics of the time, in the measure of Don Juan. He visited Europe in 1822, and in 1827 published anonymously an edition of his poems (3d ed., enlarged, 1845). In 1865 he published Young America, a poem of three hundred lines. His complete Poetical Writings have been edited by his biographer (1869). Halleck is a fair poet. His style is spirited, flowing, graceful, and harmonious. His poems display much geniality and tender feeling. Their humour is quaint and pungent, and if not tich, is always refined. See his Life and Letters, edited by James Grant Wilson (1869).

Halleck, Henry Wager, an American general, was born at Westernville, New York, 16th January 1815, and graduated at West Point in 1839. During the Mexican war he was employed in the operations on the Pacific coast, and for his gallant services was breveted captain in 1847. He took a leading part in organising the state of California, became captain of engineers in 1853, left the service in 1854, and for some time practised law in San Francisco. On the outbreak of the civil war he was commissioned major-general in the regular army, and in November 1861 was appointed commander of the department of the Missouri, which in a few weeks he reduced to order. In March 1862 the Confederate first line had been carried from end to end, and Halleck's command was extended so as to embrace, under the name of the department of the Missi-sippi, the vast scretch of territory between the Racky Monutains and the Alleghanies. His services in the field ended with the capture of Coninth, with its fifteen miles of intrenchments, in May 1862. In July he hecame general in-chief of all the armies of the United States; and henceforth he directed from Washington the movements of the generals in the field, until, in March 1864, he was superseded by General Grant. Halleck was chief of staff until 1865, commanded the military division of the Pacific until 1869, and that of the South until his death, 9th January 1872. His Elements of Military Art and Science (1846; new ed. 1861) was much used during the civil war; and he also published books on mining laws, &c.

Hälleflinta (Swedish), a very hard compact rock, yellow, red, brown, green, gray, or black. It is composed of an intimate mixture of siliceons and felspathic matter, with occasionally scales of chlorite or mica. In hand-specimens it might be readily mistaken for a compact felsite, but in good sections in the field it generally occurs in thin beds and bands. It appears to be a metamorphic rock—in some cases an altered volcanic mud.

Hallein, a town of Anstria, 10 miles S. of Salzburg, is noted for its salt-works and saline baths. Salt is made to the amount of 220,000 ewt. annually. Pop. 3727.

Hallelujah, or Allelula (Heb., 'Praise ye Jehovah'), one of the forms of doxology used in the ancient church, derived from the Old Testament, and retained, even in the Greek and Latin liturgies, in the original Hobrew. The singing of the doxology in this form dates from the very earliest times; but considerable diversity has prevailed in different churches and at different periods as to the time of using it. In general it may be said that, being in its own nature a canticle of gladness and trimuph, it was not used in the penitential seasons, nor in services set apart for occasions of sorrow or humiliation. In the time of St Augustine the hallelujah was universally used only from the feast of Easter to that of Pentecost; but a century afterwards it had become

the rule in the West to intermit its use only during the season of Lent and Advent, and on the vigils of the principal festivals. In the Roman Catholic Church this usage is followed.

Haller, Albrecht von, anatomist, botanist, physiologist, and poet, was born at Bern, 16th October 1708. He was a sickly but remarkably precocious child. After a severe course of study, precotous clild. After a severe course of study, at Tubingen, Leyden (where he graduated in 1727), London, Paris, Oxford, and Basel, he settled down to practise as a physician at Bern in 1729. There, in the course of seven years, his botanical researches, especially on the flora of Switzerland, and his anatomical investigations, spread his fame through Enrope, and led to his heing called (1736) to fill the chair of Medicine, Anatomy, Buffany, and Surgery at the newly-Anatomy, Botany, and Surgery at the newly-founded university of Gottingen. Here he organised a lotanical garden, an anatomical museum and theatre, and an obstetrical school; helped to found the Göttingen Royal Academy of Sciences; wrote a great number of anatomical and physiological works; took an active part in the literary movement which culminated in the golden age of Goethe and Schiller; and interested himself in nearly all the questions of the day. In 1753 this many-sided man resigned his offices and dignities at Göttingen and returned to his beloved Bern, where the rest of his life was spent, his energies being principally occupied with the duties of 'anuman' or mugistrate, Nevertheless he found time to write three political romances, and to prepare four large works on the bibliography connected with botany, anatomy, sungery, and medicine. Critics of the standing of Vilmar name him first among the regenerators of German poetry, and irst among the regenerators of German poetry, and give him the credit of beginning the new epoch. His poems were descriptive, didactic, and (the hest of them) lyrical. Haller died at Bern, 12th December 1777. His name is particularly connected with muscular irritability, the circulation of the blood, and numerous excellent descriptions, of an anatomico-physiological character, of important parts of the human body. Of his voluminous writings the chief were Icones Anatomicae (1743-50), Opuscula Anatomica Minora (1762-68), Disputationes Anatomica Selectiores (1746-52), Elementa Physiologic Corporis Humani (1757-66), De Respiratione (1746-49), De Functionibus Corporis Humani Pracipuarum Partium (1777-78), Opuscula Pathologica (1755), Enumeratic Stirpinm Helveticarum (1742), Opuscula Botanica (1749), and Gedichte (1732; new ed. 1882). See Lives by Blösch and Hirzel (1877) and Frey (1879).

Halley, Edmund, astronomer and mathematician, was born at Haggerston, near London, 29th October 1656, educated at St Pani's School, and afterwards at Queen's Callege, Oxford, which he entered in 1673. Before leaving school he became an experimenter in physics, and noticed the variation of the compass. In 1676 he published a paper (in Philosophical Transactions) on the orbits of the principal planets, also observations on a spot on the son, from which he inferred the smi's rotation on its axis. In November of the same year he went to St Helena, where he applied himself to the formation of a catalogue of the stars in the southern hemisphere, which he published in 1679 (Catalogus Stellarum Australium). Soon after his election as a Fellow of the Royal Society, he was deputed by that body to go to Danzig (1679) to settle a controversy between Hooke and Helvetius respecting the proper glasses for astronomical observations. In 1680 he was again on the Continent; with Cassini at Paris he made observations on the great comet which goes by his name (see Comet), and the return of which

he predicted. After his return to England he published in 1683 (*Phil. Trans.*) his theory of the variation of the magnet. The next year the variation of the magnet. The next year he made the acquaintance of Newton—the occasion being his desire to find a test of a conjec-ture which he had made, that the centripetal force in the solar system was one varying inversely as the square of the distance. He found that Newton had anticipated him, both in conjecturing and in demonstrating this fact. For an account of Halley's connection with the publication of the Principia, sec NEWTON. In 1686 Halley published an account of the trade-winds and monsoons on seas near and between the tropics, Two years later he undertook a long ocean voyage for the purpose of testing his theory of the magnetic variation of the compass, and embodied the results of his observations in a chart (1701). In the following year he surveyed the coasts of the English Channel, and made a chart of its tides. In 1703 he was appointed Savilian professor of Geometry at Oxford, and two years later published his researches on the orbits of the comets. On the death of Sir Hans Sloane he became (1713) secretary of the Royal Society, and held that position until 1721. During this period he made valuable experiments with the diving-bell (see DIVING). In 1720, after the death of Flomsteed, he became astronomer-royal, and his last years he spent in observing the moon through a revolution of her nodes. He died at Greenwich, 14th January 1742. His Tabular Astronomicae did not appear till 1749. Among his principal astronomical discoveries may be mentioned that of the long inequality of Jupiter and Saturn, and that of the slow acceleration of the moon's mean motion. He has the honour of having been the first who predicted the return of a comet, and also of having recommended the observation of the transits of Venus with a view to determining the sun's parallax-a method of ascertaining the parallax first suggested by James Gregory.

Halliwell-Phillipps, James Orchard, a great Shakespearian scholar and antiquary, was born at Chelsea in 1820, the son of Thomas Halliwell. He studied at Jesus College, Cambridge, and, yet an undergraduate, began that long eareer as an editor which he kept up almost till the close of life. His studies embraced the whole field of our earlier literature, plays, ballads, popular rhymes and folklore, chap-books, and English dialects, and its fruits remain in the publications of the eld Shakespeare and Percy societies. As early as 1839 he was elected Fellow of the Royal and Antiquarian societies. Gradually he came to concentrate himself upon Shakespeare alone, and more particularly upon the facts of his life, the successive editions of his Outlines of the Life of Shakespeare (1848; 8th ed. 1889) recording the growing results of his discoveries. For many years he waged a brave warfare with fortune, but in 1872 he succeeded to the proporty of Thomas Phillipps, his first wife's father, and added that surname to his own. He made a royal use of his wealth, accumulating in his quaint house, Hollinghmry Copse, near Brighton, an unrivalled collection of Shakespearian books, MSS., and rarities of every kind, and dispensing hospitalities to scholarly visitors from all parts of England and America, as well as giving princely benefactions of books to Edinburgh University, Stratford, and Birmingham. Here he died, January 3, 1889. The privately printed Calendar (1887) of his collection embraced as many as 804 different items. By his will it was first offered, at the price of £7000, to the corporation of Birmingham; but it was not accepted. Apart from Shakespeare, his Nursery Rhymes and Nursery Tales of England (1845) and Dictionary of Archaic and Provincial Words (1847;

6th ed. 1868) will keep his name from being forgotten. His magnificent edition in folio of the Works of Shakespeare (16 vols. 1853-65) was published at a price prohibitive to most students.

Hall-marks, or Plate-Marks, are authorised legal impressions made on articles of gold and silver at the various assay offices in the United Kingdom for the purpose of indicating to the public the true value and fineness of the metal of which they are composed. The marks are a series of symbols, which are stamped in an embossed style extending in a line of about one-half to threequarters of an inch in length, the size of the marks varying with that of the articles on which they are impressed. They are usually stamped on every separate piece that is used to compose or make up an article. These symbols have the following representation: (1) The maker's mark, which is the initials of his Christian and surname, used since 1739. (2) The standard or Her Majesty's mark viz. for gold of 22 carats, a crown and 22; for gold of 18 carats, a crown and 18; for gold of 15 carats, of 18 carats, a crown and 18; for gold of 15 carats, 15 and 625; for gold of 12 carats, 12 and 5; and for gold of 9 carats, 9 and 375. These standard masks represent England; they are different for Scotland and Ireland. In the Edinburgh assayoffice the marks are: for gold of 22 carats, a thistle and 22; for gold of 18 carats, a thistle and 18; for gold of 15 carats, 15; for gold of 12 carats, 12; and for gold of 9 carats, a lion rampant and 22; for gold of 18 carats, a lion rampant and 18; for gold of 15 carats, a lion rampant and 15; for gold of 15 carats, a lion rampant and 15; for gold of 12 carats, a lion rampant and 15; for gold of 12 carats, a lion rampant and 15; for gold of 12 carats, a lion rampant and 15; for gold of 12 carats, a lion rampant and 15; and for gold of 12 carats, a lion rampant and 12; and for gold of earats, a lion rampant and 12; and for gold of 9 earats, a lion rampant and 9. For Ireland the standard marks are: for gold of 22 carats, a harp crowned and 22; for gold of 20 earats—extra standard for Ireland only—a plume of feathers and 20; for gold of 18 carats, a unicom's head and 18; for gold of 15 carats, 15 and 625; for gold of 12 carats, 12 and 5; and for gold of 9 carats, 9 and 375. For England the silver standard marks are a lion passant for metal composed of 11 oz. 2 dwt. of fine silver to 18 dwt. of alloy, and Britannia for 11 oz. 10 dwt. fine silver to 10 dwt. alloy. For Scotland, a thistle for 11 oz. 2 dwt., and a thistle and Britannia for 11 oz. 10 dwt. at the Edinburgh assay office; and a lion rampant for 11 oz. 2 dwt. and a lion rampant and Britannia for 11 oz. 10 dwt. at the Glasgow assay office. For Ireland, a crewned harp for 11 oz. 2 dwt. No new standard a erewned harp for 11 oz. 2 dwt. No new standard of 11 oz. 10, dwt. is assayed and marked in Ireland. The figures in the gold standards denote the number of carats fine there are in any article bearing them, pure gold being reckoned at 24 earats; so that if a piece of gold-plate or jewelry is marked with a crown and 18 it indicates that it consists of 18 parts of pure gold and 6 parts of some other and inferior metal. This allow of some other and inferior metal. This alloy would consist of three-fourths gold and one-fourth alloy. Gold as low in fineness as 9 caracts is now legal, and as it is marked by the assay authorities there can be no deception if the public rightly ities there can be no deception if the public rightly understand the hall-marks introduced for their henefit. If they do not, then they are likely to be deceived. Nine-carat gold is a little over one-third nure gold. (3) The hall-mark of the assay towns: London, a leopard's head; Birmingham, an anchor; Chester, a dagger and three wheat sheaves; Sheffield, a crown; Neweastle, three castles; Exeter, a castle with three towers; Edinburgh, a castle; Glasgow, a tree, fish, and bell; Dublin, Hihernia. (4) The duty mark: the Queen's head, or head of the reigning sovereign, introduced head, or head of the reigning sovereign, introduced in the year 1784. (5) The dato mark: each assay office has now its letter or date mark, changed every year; 20 to 26 letters of the alphabet being used in rotation, and repeated in different styles of

letter. In London the assay year commences on the 30th May, and is indicated by one of twenty letters of the alphabet, A to U, omitting the letter J. The question has been raised whether the hallmarking system ought not to be discontinued.

The question has been tailed whether that marking system ought not to be discontinued.

The following table (made up from Cripps) shows specimens of the different alphabets used by the Goldamiths' Company of London as date-letters from 1478; variety in the shape of the shields being also used as a further distinction:

1478 to 1498—Lombardic, caps., double cusps.

1408 to 1518— Black letter, small.

1518 to 1538 Lombardie, capitals.

F 1538 to 1568— Roman and other caps.

1 1559 to 1578 —
Black letter, small.

1578 to 1598— Roman, capitals.

1598 to 1618—Lombardic, capitals, external cusps

1618 to 1638— Italian, small. 1638 to 1658—

Court hand.

1658 to 1678 -Black letter, capitals.

1678 to 1696 — Black letter, small 1696 to 1716— Court hand.

1716 to 1736 -Roman, capitals.

Roman, small.

1756 to 1776—
Black letter, capitals,

1776 to 1796-Roman, small.

A 1796 to 1816— Roman, capitals,

1816 to 1836 — Roman, Small

Black letter, capitals, b 1856 to 1876— Black letter, small.

∫ Black letter, small. Fi 1876 to 1896—

1876 to 1896— . Roman, capitals

The accompanying figure shows a Binningham silver plate mark. 1, the maker's initials; 2, the standard mark; 3, the hall-mark of Birming-

ham; 4, the duty-mark; 5, the date-letter for the year 1889.

See Cripps, Old English Plate, its Makers and Marks (1878; new ed. 1889); and Gee, The Hall-marking of Jewellery practically considered (1889).

Halloween, the name popularly given to the eve or vigil of All Hallows, or festival of All Saints, which being the 1st of November, Halloween is the evening of the 31st of Ootober. In England and Scotland it was long conscerated to harmless fireside revelries, with many ecremonies as means of divination by which to discover a future sweetheart. These, in so far as still current in Scotland in the later half of the 18th century, are admirably summarised in Burns's well-known poem, Halloween. See Chambers's Book of Days, vol. ii.

Hallucinations. To realise in any proper way what memory is from the physiological point of view, we must assume that every impression on the senses is conducted by molecular movements through the nerves to the ultimate cells of the brain, which then undergo a certain molecular change that is revealed to conscionsness as the qualities of the thing seen or heard or felt. By a process of instinctive reasoning the thing itself is thus instantly realised in the grown man, but not in the child. This molecular change in the cells may be evanescent, or it may be said to be 'registered,' so that it can come before consciousness again, and be 'remembered.' Each act of memory of the same impression in a healthy brain adds to the distinctness of the registeration, and it is thus more and more easily recalled or suggested, either spontaneously or from without. The millions of brain-cells contain an inconceivable number of such registered impressions of things seen, heard, tonched, smelt, and tasted, besides the impressions of past states of feeling, past trains of thought, and recombinations of

them by means of the imagination. It is in no way thought a strange thing that we can recall all these in memory at any time, or that by unconscions processes of association they project themselves across the field of conscionsness irrespective of our wills. It is not thought so very strange that, when we take a dose of opinm or cocaine, the registered images lying in the brain-cells rise up and come across our conscionsness so vividly that we cannot distinguish between them and real objects seen with the eyes. The same phenomenon often occurs in conditions of half sleep. In dreaming the impressions appear perfectly real to the half-conscionsness existing at the time.

Now there are certain very sensitive people, who have an element of the morbid in their brain condition or heredity similar to the morbidness caused by a dose of cocaine. This being so, what is the difficulty in believing that those regis-tered brain images should stand out, and seem to the conscionsness as real as the original impression, and so produce a hallnerination, or a subjective impression from an image already in the brain that is practically the same to the consciousness as the impression from a real object? This is in no way more remarkable than memory itself. It is simply more unusual. It is very questionable whether the original acts of memory of the young child are not all of the nature of hallucinations. The after recollections of things seen and of things imagined are certainly so real to some children that they confuse them with things seen or experienced. If a man can by using tests, and by the use of his reason, he made to know that the thing that appears to be seen and real is not so, and has no objective existence where he sees it, and that it is his brain that is playing him a trick, he has a same hallucination. If he cannot be made to do so, and thinks it a real object, he is insane to this extent. The condition of hypnotism illustrates the origin of hallucinations hetter than almost anything clse. Hypnotism (q.v.) is a modified, artificially induced sleep, in which the consciousness is changed but not abolished, and the reasoning power much impaired. If a person hymotised is told that a piece of ice is reduct, he will not touch it, and if he is made to do so, he behaves as if he had touched hot iron. His whole mental condition is one of temporary hallucinations of every surt. Yet in the face of all these scientific facts and reasonable hypotheses and deductions we have persons calling in the aid of imaginary forces, 'telepathy,' 'spirits,' 'psychic force,' &c., to explain hallneinations, and associations formed for 'psychical research,' evidently on the theory that there can be a cause for hallneinations other than the registered images in the brain itself, together with altered conditions of consciousness. Many religious leaders and others in a state of intense brain excitement from religious or other causes have had hallucinations, after they had been sinning against nature's laws by depriving themselves of sleep and of exercise, and by exposing themselves to the contagion of morbid feeling interspersed by reason or common sense. Luther's seeing the devil, and throwing his ink-bottle at him, and Swedenborg's seeing spiritual beings among the ministers at the council board are certainly explicable on the theory of suggestion and a temporary morbidness of brain-working.

But, say the telepathists, 'two people have had the same hallucination at the same moment. How can that be explained on brain-cell principles?' If two people had been thinking of the same thing—for example, a dear friend or relative of both who was ill and supposed to be dying—and if both were sensitive persons, and their feelings were very excited at the time, what marvel is it if

through a rare coincidence they had seen the form of the dying friend? And if this impression hap-pened to be near the time when he died, is it remarkable in the unscientific state of most minds that they made out it was the same moment that they both saw their friend's form appear and walk out at the door? When such duplicate hallucina-tions are probed by hard scientific methods it is always found that the hour of seeing them by the two people was not quite the same, that one had previously made a suggestion to the other forgotten in the excitement of the moment, or that the figures seen by them had on different clothing, or had quite different beards. Without far more evidence than has been brought forward by the pseudo-scientific believers in ghosts and amenitions and scientific believers in ghosts and apparitions, an age of science will never admit a hallneination to be anything but a brain phenomenon, obscure perbaps, but no more obscure than many other correlated facts of brain and mind. Every advance that is made in our knowledge of the brain and its working in relation to mind renders the rational and scientific explanation of all the hallucinations of the same recorded by trustworthy, unbiassed observers more easy and probable, and makes less oxcusable the calling in to explain the facts of new and unknown 'forces' or 'influences' in nature beyond thoso we know and can sciontifically investigate. Hallneinations may be of all the emplication, from flashes of light to armies of uen, from humanings in the ear to strains of 'celestial music.' But it has never heen proved, as onght certainly to have occurred if there was any roality in those occult forces, that anything has ever been soon or heard by any one which the person might not possibly have seen or imagined previously, so that its image might be lying registered in his brain-cells; and no new knowledge has ever come to humanity from such sources. Hallucinations were much more common such as a such as the sources. among primitive peoples and in the early ages of the world than they are now. See Insanfry.

524

Halluin, a town in the French department of Nard, 10 miles NNE, of Lille. Weaving of linen and woollen goods, bleaching, brick-making, and the manufacture of oil, chemicals, and chocolate are the principal industries. Pop. 9409.

Halmstad, a seaport of Sweden, and capital of the province of Halland, on the Cattegat, 75 miles SE. of Gothenburg, with trade in corn, wood, flour, and coal, and salmon-lisheries. Pop. (1888) 10,492.

Halogens, or Salt-Producers (Gr. hals, 'salt'), are a woll-characterised group of non-metallic eloments—chlorino, bromine, iodine, and fluorine—which form with metals compounds analogous to sea-salt. For haloid salts, see Salt.

Haloragen, an order of thalamifleral dicotyledons, vegetatively reduced from Onagraceae (q.v.). There are about seventy known species, herbaceous or half-shrubby; universally distributed, and almost all aquatic, or growing in wet places. The stems and leaves often have large air-cavities. The plants are insignificant in appearance, and the flowers generally much reduced. None of them have any important uses, except those of the genns Trapa (q.v.). The only Brifish species are the Mare's Tail (Hippuris vulgaris) and the Watermilfoils (Myriophyllmu).

Halos and Coronae. Halos are circles of light surreunding the sun er moon, and are due to the presence of ice-crystals in the air. The commonest and usually the brightest has a radius of about 22 degrees—i.e. this is the angular distance from the sun to its inner edge. This size can be computed from the hexagonal shape and known refractive power of ice-crystals. The

calculation shows that light passing through the sides of such a crystal is bent at an angle varying with the direction in which it falls on the crystal. but never less than 211 degrees, which is therefore called the angle of minimum deviation, and in the greater number of cases not greatly exceeding that angle. If, therefore, the air between the observer angle. If, therefore, the air between the observer and the sin or moon be lilled with such crystals the light will be thrown outwards beyond the angle of minimum deviation, and will mostly appear at about 22 degrees distance from the sun or moon, forming a circle round it. As blue light is slightly mere refrangible than red it is threwn farther out, and the halo appears coloured red inside and blue outside. Some of the crystals may, however, be lying so that the light enters at a side and leaves at one end, or vice versa, in which case the angle of minimum deviation is about 46 degrees, at which distance a second fainter hale is frequently seen with colours in the same order as in the first. These colours are generally well seen in solar halos, but not in lunar, as the moon's light is too faint to give distinct colour to each part. In addition to the above, a third still larger halo has been seen. There are only four observations of this halo on record, and the radius has been estimated in the different eases at from 81 degrees to 90 degrees. This halo has not been ascertained. The cause of It is not coloured, and may be due either to some more complex form of icc erystal or to internal reflection from the hexagonal crystals.

Another phenomenon sometimes seen with halos is the Parhetic circle, which is a white circle passing through the sun and parallel with the horizon. It is caused by light reflected from the surfaces of ice-crystals falling vertically through the air. When the sun is near the horizon this circle is intensified at distances of 22 degrees and 46 degrees from the sun, and forms parholia or mock-suns, and another mack-sun is sometimes seen on this circle directly opposite the sun. A similar circle is also formed passing vertically through the sun by reflection from the upper and under surfaces of the ice-crystals. Halos are sometimes accompanied by contact arches, which are arcs of circles tauching the halos of 22 degrees and 46 degrees; they are formed by long hexagonal prisms floating horizontally in the air, and are enryed away from the sun when it is below 30 degrees altitude, but are concave towards it at greater elevations. Several other more complex forms of halo have been seen in the arctic regions, but are of rare occurrence in Britain.

Itales must not be confused with Corone, which are smaller coloured circles that appear round the sm or moon when they shine through thin cloud or mist. In these the red is the entermost colour, and several successive sets of coloured rings are usually formed. They are due to the diffraction the light undergoes in passing among the drops of which the cloud is composed. The radius of the first red ring of a corona varies from 1 degree to 3 degrees, according to the size of the dreps, and the radii of the others are successive multiples of that of the first.

When the sun shines on a bank of fog a large bow of about 40 degrees radius, resembling a rainbow, but not so brightly coloured, is seen. It is often double, like the rainbow. Owing to the smaller size of the water-drops in a fog than in talling rain, the Fogbow is wider and fainter than the rainbow. The law determining the order of the celours—whother red inside or red entside—has not yet been thoroughly worked out. If the observer is standing on an elevated point so that his shadow falls on the fog, coloured rings called Glories or Anthelia are often seen. Five or six sets of colours have been observed, the outermost

having a radius not exceeding 12 degrees. In each ring the red is outside, showing that it is a diffraction effect like a corona, but the exact cause has not been determined. If the fog is very near, the observer's shadow is visible, forming what is known as the Brocken Spectre (see MIRAGE); and if the fog is thin the shadow looks farther away than it really is, and is therefore supposed by the spectator to be of gigantic size.

Halos, in religious art. See NIMBUS.

Hals, Frans, the elder, portrait and genre painter, was born, probably at Antwerp, in 1580 or 1581, though some authorities give 1584 as the date. His parents, members of an old Haarlem family, returned to that city about 1600, and Hals studied under Karel van Mander and, according to some accounts, nucler Ruhens. Some ten years later he married Anneke Hermanszoon, and in 1615 he was summaned before the magistrates and reprimanded for ill-treating his wife and for his drinken and disorderly life. A few weeks later his wife died, and in 1617 he married a woman of doubtful character, Lysbeth Reynier. In his later years, in spite of his unceasing industry, to which the numerous works from his hand in the continental galleries lear witness, he fell into poverty, and was relieved by the municipality of Haarlen, who in 1664 bestowed on him a pension of 200 florins. He died at Haarlem in 1666, and on the 1st of September was buried in the church of St Bavon. Huls is usually regarded as the founder of the Dutch school of genre-painting. Hissubjects of feasting and caronsal are treated with marvellous vivacity and spirit, and as a portrayer of faces convulsed with laughter he is without a rival. His portraits are full of character, and catch with admirable subtlety the lightest shades of passing expression. Technically his work is masterly, his handling being most direct and powerful; but a certain hardness and crudeness of tone is frequently apparent in his rendering of flesh, and his later works have little variety of colonning, and show an unpleasant blackness in the shadows. Of his portrait groups eight noble examples are preserved in the museum of Haarlem, the finest being that dated 1633, representing the officers of the corps of St Adrian. The 'Mandoline Player' (1630), in the 1633, representing the officers of the corps of Staddian. The 'Mandoline Player' (1630), in the gallery of Amsterdam, is a typical example of his treatment of single figures. A series of excellent etchings after the works of Hals, by Professor William Unger, with text by C. Vosmaer, was published in Leyden in 1873. As a teacher he exercised a marked influence upon the development of Dutch art, Jan Verspronck, Van der Helst, Adrian van Ostade, Adrian Bronwer, and Wouwerman having been his pupils. An interesting Wouwerman having been his pupils. An interesting view of the interior of his studio, dated 1652, by Job Berch-Heyde, another of his scholars, is in the Haarlem Musenin.—His brother, DIRK HALS, a pupil of Abraham Bloemaert, was also an excellent genre-painter (b. before 1600, d. 1656); and several of Frans's sons were artists, the most celebrated being Frans Hals, the younger, who flourished from about 1637 to 1669.

Halstead, a market-town of Essex, on the Colne, 56 miles NE. of London. The parish church has a wooden spire and many old monunents; the free grammar-school dates from 1590. It has manufactures of crape, silk, and paper; straw-plaiting is also earried on. Pop. (1851) 5658; (1881) 5804.

Halyburton, THOMAS, a Scotch divine, was horn at Dupplin near Perth in 1674, and was for cleven years minister of Ceres in Fife, and then for two professor of Divinity at St Andrews, where he died in September 1712. He was the author of several works, including Natural Religion insufficient, and Revealed necessary, to Man's

Happiness; The Great Concern of Salvation; and Ten Sermons preached before and after the Celebration of the Lord's Supper. The works, especially the autobiographic memoir, of the 'Holy Halyburton' were once very popular among the people of Scotland; and even at the present day they are still read. They were published, together with an Essay on his Life and Writings, by Dr Robert Burns (London, 1835).

Halys. Sec Asia Minor.

Ham, properly the hind part or angle of the knee; but usually applied to the cuted thigh of the hog or sheep, more especially the first. Hameuring, or, what is the same thing, bacon-curing, or white is the same sing, income only, is performed in a variety of methods, each country or district having its own peenliar treatment; these, however, relate to minor points. The essential however, relate to minor points. The essential operations are as follows: The meat is first well rubbed with salt, and either left on a bench that the hrine may drain away, or covered up in a close vessel; after a few days it is rubbed again, this time with a mixture of salt and saltpetre, to which sugar is sometimes added, or with a mixture of salt and sugar alone. It is then consigned to the bench or trib for at least a week longer, after which it is generally ready for drying. Wet salting requires, on the whole, about three weeks; dry salting, a week longer. Mutton-hams should not be kept in pickle longer than about three weeks. Some hams are merely hung up to dry without being smaked; others, after being dried, are removed to the smoking-house, which consists of two and sometimes three stories; the fire is kindled in the lowest, and the meat is hung up in the second and third stories, to which the smoke ascends. is kept up with supplies of oak or heech chips, though in some districts twigs of juniper, and in many parts of Great Britain peat, are used. Fir, larch, and such kinds of wood, on account of the unpleasant flavour they impart, are on no account to be used. The fire must be kept, night and day, in a smouldering state for three or four days, at the end of which time the ham, if not more than five or six inches deep, is perfectly smoked. As cold weather is preferable for the operation of curing, it is chiefly carried on during winter. Many of the country-people in those parts of England where wood and peat are used for fuel smoke hams by hanging them up inside large wide chimneys, a method common in Westmorland. The curing of beef and mutton hams is carried on chiefly in the north of England and Dumfriesshire in Scotland; that of pork-hains, on the other hand, is found in various countries, among the best known being those connected in commerce with the names of Belfast and Westphalia. Harris of Calne, Wiltshire, introduced an ammonia freezing-process available both summer and winter. Chicago (q.v.) is the chief centre of the coormous American industry of pork-packing. The imports of bacon and hams into the United Kingdom in 1888 amounted to 3,594,212 cwt., of a value of £8,343,387. Of this quantity the value from the United States was £3,874,170, from Denmark £1,389,047. The import of hams only in 1888 was 730,408 cwt., of the value of £1,929,602. The total value of the imports of bacon and hams in 1886 was £8,402,828; in 1887, £8,738,776. The total export of bacon and hams from the United States was £31,640,211 in 1886, and £33,314,670 in 1887. See Pig.

Ham, a town in the French department of Somme, on the river of that name, 12 miles SW. of St Quentin. Its ancient fortress or eastle was rebuilt by the Comte de Saint Pol in 1470, and now is used as a state-prison. It is memorable as the place of confinement of Joan of Arc, Moneey, and others; of Polignac, Peyronnct, and

Guernon de Ranville from 1831 to 1836; of Louis Napoleon from 1840 till 1846; and after the coup d'état, of the republican generals Cavaignae, Lamorieière, Changarnier, &c. Pop. 2837. See Gomaid, Ham, son Château, &c. (1864).

Ham, West, a suburb of East London, and a parliamentary borough of Essex, on the north bank of the Thames, opposite Greenwich. During the last fifty years its population has grown from 10,000 to 128,953 (1881), principally owing to the Victoria and Albert docks and the gas-works. It is a busy industrial parish, and has silk-printing, shipbuilding, distilling, and chemical manufactures. In 1885 it was made a parliamentary borough, returning two members to the House of Commons. Here is alres Elizabeth Fry's house, 'The Cedars.'—East Ham, situated in the south-west of the same county, 11 miles SW. of Barking, has a population of 9713. See Katharine Fry, History of the Parishes of East and West Ham (1888).

Ham, according to the writer of Genesis, was the second son of Noah, and the brother of Shem and Japheth. The name, however, as generally used, is geographical rather than ethnographical. The word flum in Hebrew signilies 'to be hot,' and the descendants of this son of Noah are represented as peopling the southern regions of the earth, so far as known at that time—viz. Arabia, the Persian Culf. Egypt, Ethiopia, Lihya, &c. Ham has also been identified with Kemi ('black hand'), an ancient name of Egypt: Int for this identification there exists no satisfactory philological evidence. Philologists and ethnologists recognise as a distinct family of peoples and tongues a group which they call 'flamitic,' classifying it as co-ordinate with the Aryan and the Semitic. See Africa, Vol. I. pp. 85, 86.

Hamadan, a town of Persia, in the province of Irak Ajemi, is situated at the northern base of Mount Elwend, 160 miles WSW. of Teheran. It contains some notable tombs—e.g. Avicenna's (q.v.) and others allirmed to be those of Mordecai and Esther. Being the centre of converging routes from Bagdad, Erivan, Teheran, and Ispahan, it is the seat of a large transit trade; and it carries on extensive manufactures of leather, and in a less degree of coarse carpets and woollen and cotton fabrics. Pop. 30,000. Hamadan is generally believed to occupy the site of the Median Echatana (q.v.).

Hamadryads. See Nympus,—The name Hamadryas is given to a kind of Buboon (q.v.); and the Hamadryas or Ophtophagus claps is the largest poisonous snake of the Old World, larger and more dangerous than any of the cobras, with which it has almost the same geographical range.

Hamah (Gr. Epiphania), the Hamath of the Bible, a very ancient city of Syria, on the Orontes, 110 miles N. by E. of Damascus. The town stands in the midst of gardens, though the streets are narrow and irregular, and the houses are built of sun-dried bricks and wood. The inhabitants, about 45,000, numufacture coarse woollen mantles and yarn, and carry on considerable trade with the Bedouins. Hamath seems to have come very early in conflict with the Assyrians, having been taken by them in 854 B.C. and again in 743, whilst two revolts of the people were crushed by the Assyrians in 740 and 720 n.C. After the Grace-Macedonian conquest of Syria, Hamah became known as Epiphania. In 639 it fell inte Moslem hands, and, though it was held by Tanered from 1108 to 1115, it was again taken possession of by the Moslems. Abulfeda, the Arab geographer, was prince of Hamah in the 14th century. Four stones were diseevered there in 1812 by Burckhardt, bearing inscriptions in an nuknown language, now believed to be Hittite (q.v.).

Hamamelideæ. See Witch HAZEL

Hamann, Johann Georg, a German writer, born at Konigsberg in Prussia, 27th August 1730. The incompleteness and aimlessness which characthe incompleteness and animessies which characterised his education ching to him all his days; he made numerous starts in life, but followed no one ealling for long; in turn, student of philosophy, of theology, of law, private tutor, merchant, tutor again, commercial traveller, student of literature and the ancient languages, and clock, he at length settled down in Konigsberg in 1767 as an official in the excise. Nevertheless he lived but meanly until the excise. Nevertheless he lived but meanly until the present by a patron, in 1784, of a sum of money raised him above want. He died at Minister, 21st June 1788. His writings are, like his life, desultory and without system; but even as such they exercised a perceptible influence upon Jacob, Herder, Goethe, and Jean Paul. For in spite of then symbolical and oracular style, qualities which led to their author being designated the 'Magns of the North,' they contain the results of thoughtful and extensive reading, are rich in suggestive thought, enernsted with paradox and sarcasm, and thoroughly bristle with literary allusions. Hamann's independence and love of honest truth made him, however, nupopular with his contemporaries, except the more thoughtful lew. Compare Roth's edition of his Sammiliche Schriften (8 vols. 1821-45) or Gildemeister's (6 vols., including biography, 1857-73). See Lives by Poel (1874-76) and Classen (1885).

Hambato, or Ambato, capital of Tunguragna province, Ecnador, in a sheltered amphitheatre on the northern stope of Chimborazo, 8800 feet above the sea. It was twice destroyed—by an emption of Cotopaxi in 1698, and by an earthquake in 1796, but was speedily relmilt. Pop. 12,000.

Hamburg, a constituent state of the German empire, includes the free city of Hamburg, the towns Bergedorf and Cuxhaven, and several submiss and communes, with a total area of 158 sq. m. The free Hanscatic city of Hamburg is situated on the Elbe, about 75 miles from the German Ocean, 112 N. of Hanover, and 177 NW. of Berlin. Hamburg was founded by Charlemagne in 808, and for three centuries had to struggle hard to maintain itself against the manualing Danes and Slavs. It was made a bishopric in 831, and three years later an archbishopric. This last dignity was transferred to Bremen in 1223. The commercial history of Hamburg began in 1189-90, when the emperor granted it various privileges, amongst others a separate judicial system and exemption from customs dues. In 1241 it joined with Lubeck in laying the foundation of the Hansentic League (q.v.), and from 1259 associated itself closely with Bremen also. From that time it increased rapidly in wealth and commercial importance, augmenting its territory by the purchase of the township of Ritzebittel, at the mouth of the Elbe (where the harbour of Cuxhaven is now situated), and of several villages and islands in the vicinity of the town. Under the protection of the German emperors Hamburg soon became powerful enough te defend itself and its commerce both by sea and land, and carried on war for a considerable period against sea-rovers and the Daues. In 1510 it was made an imperial town by Maximilian I. It early embraced the doctrines of the Reformation. During the stormy period of the Thirty Years' War it never had an enemy within its walls. All through the years from 1410 to 1712 there were repeated risings of the populace against the governing classes. The disputes with Denmark finally ceased in 1768, that power renonucing all claim to Hamburg territory. The rapid commercial success and steadily increasing prospective of the city were only momentarily checked by a severe

commercial crisis in 1763. On the other hand, the French Revolution drove many of the *émigrés* to Hamburg, and the ranks of its merchants were still further strengthened by refugees from Holland, when that country was overrun by the French in 1795. But eleven years later Hamburg itself was occupied by the French, and with that event there commenced for the city a period of great tribulation. In 1810 it was annexed to the French empire, but at the same time lost its commerce and its shipping trade. For having in 1813 admitted the Russians within its walls the city was emelly treated by Davoat, Napoleon's general; and the cup of its misery was filled to the brim by the siege which Bennigsen began in that same year.

Between 1806 and 1814, when the French ocen-pation came to an end by the equitalation of Davout to the allies, the population decreased by nearly one-half, namely to 55,000, and had to endure losses of property estimated at 47,000,000. endure tosses of property estimated at 17,000,000. In the following year Hamburg joined the German Confederation as one of the four free cities, and its prosperity began rapidly to revive. Another calamity overtook the town in 1842: in three days one-third of Hamburg was destroyed by fire, and more than two millions sterling worth of property lost. That part of the town was, however, immediately reliability in modern style. The older portion is intersected by canals, which serve as waterways between the river and the warehouses. The ramparts have been converted into gardens and promenades. In 1843 an agitation was set on foot for a reform in the constitution, a step which it took eighteen years to carry into effect. On 1st October 1888 Hamburg entered the German Customs Union, though still retaining part of its territory as a 'free part.' This change has necessitated extensive alterations in the harbour: several quays have been built, warehouses con-structed, steam-cranes erected, and the railway communication with the chief industrial centres of Germany improved. In 1890 new docks were in course of construction at Cuxhaven for the use of the great ocean-going steamers. The finest public buildings are the 'school house' (containing the town library of 400,000 volumes and 5500 MSS., and a natural history museum), town-house, and a natural instory inuseum, town-noise, picture-gallery, exchange, bank, post-office, and some churches. Of these last four are noticeable—St Nicholas, built from designs by Sir Gilbert Scott, as a memorial of the fire of 1842, a handsome (tothic building, with a spire 482 feet high; St Michael's, an 18th-century Renaissance church, with a spire 469 feet high; and St Catherine's and St Laurer's both Cathia edificacy of the ine's and St James's, both Gothic edifices of the 14th and 15th centuries. In addition to numerous excellent schools and charitable institutions, Hamburg possesses a school of navigation, with which is connected an observatory, a zoological and a botanical garden, and several museums and art-galleries. Hamburg has played an important part in the history of the German stage.

Hamburg is the busiest commercial city on the continent of Enrope, and the principal commercial scaport of Germany. Next to London it has the largest money-exchange transactions in Europe; the bank of Hamburg was founded so long ago as 1619. As a commercial centre its only rivals are London, Liverpool, Antwerp, and New York. Its manufactures, though a long way inferior in value to its commerce, are not unimportant. The principal are eigar-making, distilling of spirits, sugar-refining, brewing, engineering, iron-founding, manufacture of chemicals, india-ruliber wares, furniture, starel, and jute, and shipbuilding. In 1865 the number of vessels that entered the port was 5186, with a gross burden of 1,223,000 tons; these figures rose to 5260 vessels and 2,118,000 tons in 1875, and to 6790

vessels and 3,704,000 tons in 1885, whilst in 1887 they were 7308 vessels and 3,990,000 tons. number and tonnage of the vessels that cleared were about the same in the corresponding years, Of the vessels entering in 1887 about 36 per cent were British. The imports have increased at an extraordinarily rapid rate: in 1864 they were valued at £57,976,000, in 1875 at £85,050,000, in 1885 at £102,300,000, and in 1887 at £111,948,800. These returns do not include bullion. The total value of the trade of Hamburg with Great Britain and her possessions amounted to £28,000,000 in 1887. Of the imports about one-half represent the value of goods brought into Hamburg by rail and river (Elbe) from the interior of the country. Next after Great Britain the countries with which Hamburg has commercial transactions of the greatest magnitude are the United States, the America, France, Holland and Belginm, Central America, Russia, the East Indies and China, and the east and west coasts of Africa. Hamburg owes a large part of its trade to its position as a distributing centre for commodities brought from distant parts of the world, to be afterwards sent to the different countries of Europe. Besides coffee, the more important objects of trade are sugar, woollen and cotton goods, butter, tobacca, wine and spirits, hides, machines, tice, saltpetre, leather, herrings, flour, furs, linen, petrolenm, coal, iron, and silks. In 1885 the exports were valued at £82,800,000. Hamburg ranks second to Bremen as a port of embarka-tion for emigrants from Germany; 88,483 embarked from Hamburg in 1888. Pop. (1875) 374,930; (1885) 471,275, of whom 165,411 lived in the suburbs.

See Monckeberg, Geschichte der Freien und Hanse-Stadts Humburg (1885); Gaedechens, Historische Tojographie der Freien und Hanse-Stadt Hamburg (1880); and two historical works by Gallois (1856-57 and 1861-65).

Hameln, a town and formerly a fortress of Hanover, occupies a commanding position on the Weser, 25 miles SW. of Hanover. It presents a quite medieval appearance, having many houses and buildings surviving from the Gothic and Renaissance periods of architecture. The chain-bridge which here crosses the Weser was completed in 1839, and is about 840 feet in length. The chief employments of the people are machine-making, iron-founding, wool-spinning, fish-breeding, brewing, and the manufacture of leather, paper, artificial manure, and chemicals. In the carllest times Hameln belonged to the Abbey of Fulda, and was a member of the Hanseatic Confederation. It suffered severely during the Thirty Years' War. Pop. (1885) 11,831. With this town is connected the well-known legend of the Piper (or Rateatcher) of Hameln, who in 1284 freed the town from rats through the mystic charm of his pipe; but, when the people refused to pay him the promised reward, he exercised the power of his music upon the children of the place, and drew them away into the heart of an adjoining bill, which opened to receive them, and through which he led them to Transylvania. The story is familiar from Browning's 'Pied Piper of Hamelin.'

Hamerling, Rubert, Austrian poet, was born of poor parents at Kinchberg in the Forest, in Lower Austria, on 24th March 1830. Having completed his studies at Vienna, Hamerling became a teacher in the gymnasium at Trieste in 1855. But at the end of eleven years of work, ill-health compelled him to retire. From that time dawn to the date of his death, on 13th July 1889, he lived at Gratz, almost entirely confined to his bed, but nevertheless leading a busy life as a writer of poetry. He began his career by the publication in 1860 of a volume of lyrics, Sinnen und Minnen (7th ed.

1886; each edition enlarged and improved). His lyric talent found expression also in such later works as Das Schwanenlied der Romantik (1862), Amor und Psyche (1882), and Blatter im Winde (1887). But his best books are three satirical epies —Ahasver in Rom (1866; 17th ed. 1889), Der Konig von Sion (1869), and Homuneulus (1888). In these books his theme is the problems that are knit about the inner nature of man, his mundance existence, and the institutions his mind has conecived and his hand has made. The structural conceptions are often grand, and the imagina-tion bold; the emotional and descriptive colouring is both rich and truthful, the action vigorous, the philosophy ultra-modern; and there is a firm grasp of details, and a patient and clever use of them, mostly for satirie purposes. Satire is indeed one of the strongest elements in these epies. Hamerling's remaining works include Venus in E.cil (1858); Germanenzug (1861), a translation of Leopardi's poems (1865); a movel, Aspasia (1875); a tragedy, Dunton and Robespierre (1871); two or three other dramatic pieces; Dic sieben Todsunden (1873); an autohographical work, Stationen meiner Lobenspilgerschaft (1886); Lehrjahre der Liebe (Letters, &c. 1889). Sammtliche Werke (Hamburg, 1889). See Life by A. Polzer (1889).

Hamerton, Philip Gleber, a writer on art of keen insight and picturesque and impressive style, was born at Lanesside, near Shaw, in Laneashire, on 10th September 1834. He commenced his enreer as an art-critic by contributing to the Fine Arts Quarterly, the Fortnightly and the Saturday Reviews. He produced a volume of poems on The Isles of Lock Awe (1855), and A Painter's Camp in the Highlands, and Thoughts about Art (1862). In 1868 he published Etching and Etchers and Contemporary French Painters; a continuation of the latter appeared in the following year, Painting in France after the Decline of Classicism. Since 1869 he has edited the Portfolio, an art journal which gives special prominence to etchings. The Intellectual Life (1873) is in the form of letters of advice, illustrated by many examples, addressed to literary asprants and others, of overy class and in all circumstances; Human Intercourse (1884) is a volume of essays on social subjects, many of them dealing with intercourse as affected by nationality; The Graphic Arts (1882), finely illustrated, is 'a treatise on the varieties of drawing, painting, and engraving, in comparison with each other and with nature,' the analyses of the technique of the masters of the various arts being remarkable for discrimination and acumen; Landscape (1885), a superbly-illustrated volume, is not so much a treatise on landscape-painting as a work illustrating the influence of natural landscape on man. Other works are Portfolio Papers (1889), French and English (1889), and a couple of novels.

Hamesucken, a Scotch law-term, denoting the offence of felaniously assaulting a man in his own house or lodgings. This was an aggravation of the ordinary effence of assault.

Hamilear, next to Hamilal the greatest of the Carthaginians and one of the greatest generals of antiquity. He was surnamed Barea (the Hebrow Barak) or 'Lightning,' whenee his family was known as the Barciue. When a young man he came into prominence in the sixteenth year of the First Punic War (247 B.C.), when all Sicily, save the fortresses of Drepanna and Lilybounn, had been wrested from Carthage by the Romans. After ravaging the Italian coast, he landed in Sicily, near Panornus, and seized the stronghold of Erete, a hill of 2000 feet high rising sheer from the sea. Here, with a small band of mercenaries, though he received no aid from his unworthy countrymen, he

waged almost daily war with the Romans for three years, and defied every effort to disladge him. By the spell of his genins he preserved discipline among his unpaid followers, whom he taught to banish their old dread of the Roman veterans, while with his few ships he harassed the Italian shores. In 244 B.C. he occupied Mount Eryx, a hill 2 miles from the coast and a less strong position than Ercte, but one which lay nearer to the besieged cities of Dre-panum and Lilybrum. For two years he stood at bay with his bandful of men against a Roman army, righting, says Polybins, 'like a royal eagle, which, grappling with another eagle as noble as himself, stops only to take breath from sheer exhaustion, or to gather fiesh strength for the next attack,' The hattle of the Ægatiun Isles in 241 B.C. ended the First Punic War, and Sicily was yielded to Rome. But Hamilear marched out from Eryx with all the honoms of war. Scarcely had peace been concluded when the Carthaginian mercenaries revolted and were joined by the subject Libyans. Hanno, a personal enemy of Hamilear, was sent against them. He failed, and the task of saving the state was assigned to Hamilear, who crushed out the rebellion assigned to Hamilear, who crushed out the rebellion after a terrible stangele of three years in 238 n.c. In the same year the Romans, in defiance of treaty engagements, seized on the Carthaginian possessions in Corsica. Despite the antagonism of the peace party, headed by the incompetent Hamo, the patriotic or Barcine party, though a minority, obtained the command of an army for Hamilear, with which he resolved to carry out his master-conception. He proposed to throw Sanin into the belease tion. He proposed to throw Spain into the balance to redress the loss of Sicily. Spain was not only rich in mineral and other wealth; she would form an admirable recruiting ground. The main defect in the Carthaginian armies hitherto had been the want of an infantry capable of coping on at all equal terms with the legionaries. Such a force Hamilton determined to create in Spain, whence it could be marched or carried over sea to Italy; in fatave the war would be waged on Roman soil. In 237 n.c. the general entered Spain, and in rine years built up a new dominion by his military genius, his policy, and the unigle of his personality. In 228 B.C. he fell fighting against the tribo of the Vettones. The conceptions of the great Hamileur were carried out by his mightier son. Unfortunately only a dim light is east on Hamileur's maryellous enteer. What is inconfestable is that be was a military genius of the highest order; a statesman as lefty in his conceptions as he was adroit in carrying them out; a patriat whom neither obloquy, ingratitude, nor treachery could alienate from the ignolic state he strove so hard to save. Two men only, it has been truly said, in the whole course of Roman history, seem to have struck the Romans with real terror. These were Hamilton and his greater son. See Bosworth Smith's Carthage and the Carthaginians (1879).

Hamilton, a town of Lanarkshire, on the left bank of the Clyde, 10 miles SE of Glasgow. The principal edifice is the hurgh buildings (1863), with a clock-tower neurly 130 feet high; and there are also the county buildings, large barracks, and a good racecourse. The former meanufactures of lace, tumboured bobinette, and cambric have declined; and mining is now the chief industry of the district. Hamilton was made a royal burgh in 1548, and one of the five Falkirk parliamentary burghs in 1832. Pop. (1841) 8724; (1881) 18,517, of whom 18,995 were within the narliamentary burgh, the municipal boundary having been extended in 1878.— Hamilton Palace, successor to Cadzow Castle, is the seat of the Duke of Hamilton. Dating partly from 1594, but greatly enlarged in 1705 and 1822, it is a sumptuous classical structure, though its choicest art-collections were

sold in 1882 for nearly £400,000. Within its policies are a superb mansoleum (1852), the ruins of Cadzow Castle, the herd of wild white cattle, and some primeval oaks.

Hamilton, a city of Canada, the chief town in the county of Wentworth, Ontario, is situated on Burlington Bay, at the west end of Lake Ontario, 40 miles by rail SW. of Toronto, and 56 WNW. of Niagara Falls. The business portion lies at the foot of 'The Mountain,' on whose slope many fine residences are embowered among trees and gardens. Trees line the wide, handsome streets; the houses are mostly substantial stone elections, and the court-house and county buildings are among the finest in Canada. The city is an important railway centre, stands in the midst of a populous and highly-cultivated district, at the head of the lake navigation, and is said to possess a larger number of manufactories of iron, cutton, and woollen goods, sewing-machines, boots, glass-ware, &c. than any other town in Canada. Hamilton, which was founded in 1813, is the seat of an Anglican and of a Roman Catholic bishop, and sends two members to the Honse of Commons and one to the provincial legislature. Pop. (1861) 19,096; (1881) 35,961; (1886) 41,280.

Hamilton, metropolis of the western part of Victoria, on Grange Ihrm Creek, 224 miles by rail W. of Melbourne. Two pastoral and agricultural exhibitions are held here annually, and two racemectings. Pop. 3000.

Hamilton, (1) capital of Batler county, Ohio, on the Great Miami River, and on the Miami and Eric Canal, 25 miles by rail N. of Cincinnati. It has a number of paper and flour mills, several foundries, manufactories of farming-implements, breweries, &c. Pop. (1880) 12,122.—(2) A post-village of New York, 37 miles SE. of Syraense, is the seat of Madison University, and of Hamilton Theological Seminary, both Baptist. Pop. 1638.

Hamilton, capital (pop. 2100) of Bermuda

Mamilton, a great historical family, is helieved to be of English origin. The pedigree of the family, however, cannot be carried beyond Walter Fitz-Gillert (son of Gilbert), called Hamilton, who in 1296 held lands in Lanarkshire, and swore fealty to King Edward I. of England as overlord of Seotland, and in 1314 kept the castle of Bothwell, on the Clyde, for the English. His surrender of this strong fortress, and of the English knights and nobles who had fled to it from the field of Bannockburn, was rewarded by King Robert Bruce by grants of the lands and baronies of Cadzow and Machanshire in Clydesdale, Kinneil and Larbert in West Lothian, and other lands forfeited by the Cunnyns and other adherents of England. He attained the rank of knighthood, and married Mary, daughter of Sir Adam of Gordon of Huntly. He left two sons. The elder, Sir David Pitz-Walter, was taken prisoner by the English at the battle of Neville's Cross in 1346, founded a cleantry in the cathedral of Glasgow in 1361, and appears among the barons in the Scottish parliaments of 1368, 1371, and 1373. His eldest son, Sir David of Hamilton of Cadzow, was the first to assume the surname of Hamilton.

DUKES OF HAMILTON, &c.—The family was only knightly till it was ennobled in its sixth generation, in Sir James of Hamilton of Cadzow, who in 1445 was created Lord Hamilton by a charter which consolidated his whole lands into the lordship of Hamilton, with his manor-place of 'the Orehard,' in the barony of Cadzow, as his chief messnage. In 1460 ho founded a college in the university of Glasgow—the first college in Seotland founded by a layman. He also founded and

endowed the collegiate church of Hamilton. both by marriage and by descent to the Donglases, he followed their banner in the beginning of their great struggle with the crown. But he forsook them at a critical moment in 1454, and his season-able loyalty was rewarded by large grants of their furfeited lands. At a later period, after the death of his first wife, when he must have been well advanced in years, he received in marriage the Princess Mary, the clost daughter of King James II., formerly the wife of Thomas Boyd, the attainted Earl of Arran. His only son by her, James, second Lord Hamilton, was in 1503 made Earl of Arran, and had a grant of that island, the Earl of Arran, and had a grant of that island, the downy of his mother on her first marriage. After playing an important part in public affairs during the minority of King James V., he died in 1529, being succeeded by the eldest son of his third wife (a niece of Cardinal Beaton), James, second Earl of Arran. The death of King James V. in 1542 left only an infant a few days old between him and the throne. He was at once chosen regent of the kingdom and tutor to the young queen, and declared to be 'second person in the realm.' He held his high offices till 1554, when he resigned them in favour of the queen-mother, Mary of Guise. He received in 1548, from King Henry II. of France, a grant of the duely of Chatelherault, His eldest son, the Earl of Arian, was proposed at one time as the husband of Queen Mary of Seotland, and at another time as the husband of Queen Elizabeth of England. He was afflicted with maluess in 1562, and bever recovered his reason, although he lived till 1609. His father, the first Dake of Chatchleranlt, dying in 1575, the second son, Lord John Hamilton, commendator of Arbroath, became virtual head of the house, and as such was in 1599 created Marquis of Hamilton. He died in 1604, being succeeded by his son James, the second narquis, who in 1619 was created Earl of Cambridge in England, and died in 1625. His eldest son, James, the third marquis, led an army of 6000 men to the support of King Gustavus Adolphus of Sweden in 1631-32, and later acted a conspicuous part in the great contest between King Charles I. and the Scottish Covenanters. That king in 1643 ereated him Duke of Hamilton, with remainder to the heirs-female of his body, in the event of the death of himself and his brother without male issue. In 1648 he led a Scottish army into England for the king's relief, but was encountered and defeated by Cromwell at Preston, in Lancashire, and, ultimately forced to surrender to the parliamentary forces, was beheaded at Westminster in March 1649. He was succeeded by his brother William who in 1639 had been created Earl of Lanark, and died in 1651 of the wounds which he had received at the hattle of Worcester. The duely of Hamilton now devolved on the eldest daughter of the first duke, Lady Anne, whose husband, Lord William Douglas, Earl of Selkirk, was in 1660 created Duke of Hamilton for life. He died in 1694, and in 1698 the Duchess Anne, who survived till 1716, resigned her titles in the king's hands in favour of her eldest son, Junes, Earl of Arran, who was anew created Duke of Hamilton, with the precedency of 1643. In 1711 he was created Duke of Brandon in England, but the House of Lords refused him a seat or vote in parliament, on the ground that the erown was disabled by the Act of Union from granting a peerage of Great Britain to any person who was a peer of Scotland before the Union. The duke was killed in a duel in Hyde Park with Lord Molum in 1712. His grandson, James, the sixth duke, who married the famous beauty, Elizabeth Gunning, was succeeded in 1758 by his eldest son, James George, an infant of three years old. On the death of the Duke of Douglas

in 1761, the male representation of the 'red' or Angus branch of the Douglases, with the titles of Marquis of Douglas, Earl of Augus, &c., devolved on the Dukes of Hamilton, as descendants of the Duchess Anne's husband, William, Earl of Selkirk, third son of the first Marquis of Donglas. Dying in 1769, in his fifteenth year, James George, seventh brike of Hamilton, was succeeded by his only brother, Donglas, who in 1782 took his seat in parliament as Duke of Brandon, the House of Lords being now satisfied, after consultation with the twelve judges, that the Act of Union did not prohibit the crown from making a peer of Scotland a peer of Great Britain. He, in turn, was succeeded by his uncle, ancestor of the present or twelfth duke, who was horn in 1845.

DUKES OF ABERCORN, &c.-Lord Claud Hamilton, fourth son of the first Duke of Chatelherault, was appointed commendator of the abbey of Paisley in 1553, and created Lord Paisley in 1587. descendants obtained successively the titles of Lord Abercorn (1603), Earl of Abercorn (1606), Viscount Strahane (1701), Marquis of Abercorn (1790). On the death of the second Duke of Hamilton in 1651, the second Earl of Abercorn claimed the male representation of the House of Hamilton; and in 1861 the second Marquis and tenth Earl of Abercorn (created Duke of Ahereon in 1868) was served heirmale of the first Duke of Chatelherault, in the Sheriff male of the first Pirke of Canada Brants, if the Sherin Court of Chancery at Eddinburgh, under protest by the Duke of Hamilton, Brandon, and Chatcherault. Dying in 1885, he was succeeded by his son James, the second duke, born in 1838. The Duke of Aber-corn is one of three peers who hold peerages in Scotland, in Ireland, and in Great Britain. A cadet of the House of Ahercorn, born in 1646, was

Count Anthony Hamilton (q.v.).
OTHER PEERAGES.—The third son of Anne,
Duchess of Hamilton, was in 1688 created Earl of Selkirk: this title became extinct in 1885 on the death of the sixth earl.—Lord George Hamilton, fifth son of Inchess Anne, was in 1696 created Earl of Orkney. The sixth earl succeeded in 1877.--A of Orkney. The sixth earl succeeded in 1877.—A fourth son of Duchess Arme was in 1697 created Earl of Ruglen—a title that became extinct in 1810.—The Earls of Haddington are descended from a younger son of the first ascertained ancestor of the Hamiltons, Sir Walter Fitz-Gilbert.—Sir John Hamilton of Biel was created Lord Belhaven and Stenton. The second lord distinguished himself by his wild but cloonent speeches against the self by his wild but cloquent speeches against the Union. On the death of the lifth lord in 1777 the title and estates became separated; the title became dormant in 1868, but was adjudged in 1875 to the ninth lord.—A descendant of the first Lord Paisley became Viscount Boyne in 1717, and his descendant became in 1866 Baron Brancepeth in the peerage of the United Kingdom.—Another branch of the Hamiltons, settling in Ireland, attained to the dignities of Viscount Clanchoy (1622) and Earl of Clanbrassil. The titles became extinct in 1799, but the title of Lord Clanbrassil in the peerage of the United Kingdom was created in 1821

A Briefe Account of the Family of Hamilton, written by Dr James Baillie of Carnbroe during the first half of the 17th contrny, is preserved among the MSS, in the Advocates' Library at Edinburgh. See Gilbert Burnet's Memoirs of the Lives and Actions of James and William, Dukes of Hamilton and Chatetherault (1077); Anderson's Historical and Genealogical Memoirs of the House of Hamilton (1825); 'The Manuscripts of the Duke of Hamilton, K.T.' in part vi. of Appendix to the Eleventh Report of the Historical MSS. Commissioners (1887); and the history of the Earls of Haddington by Sir Win. Fraser (2 vols. 4to, 1889).

Hamilton, ALEXANDER, one of the greatest of American statesmen, was horn 11th January 1757

in the West Indian island of Nevis, the son of a Scotch merchant who had married a young French-woman. His father soon failed in business, and Alexander at the age of twelve had to enter the counting-house of a merchant named Cruger at St Croix. His extraordinary abilities, however, induced some of his friends to procure for him a better education than could be got at home. He was accordingly sent to a grammar-school at Elizabethtown, New Jersey; and in the spring of 1774 he entered King's (now Columbia) College, New York. On the first appearance of disagreement between Great Britain and her colonies, Hamilton, still a collegian and barely eighteen, wrote a series of papers in defence of the rights of the latter, which were at first taken for the production of the eminent statesman Jay, and which secured for the writer the notice and consideration of the popular On the outbreak of the war ho obtained a commission as captain of artillery, saw some active service in New York and New Jersey, and gained service in New 1018 and New Jersey, and gamed the confidence of Washington, who made him his aide-de-camp in 1777, and with whom he acquired the greatest influence as his friend and adviser. In 1781, through hasty temper on both sides, the friendship was broken for a brief period, and Hamilton resigned his appointment on the staff; lmt he continued with the army and distinguished himself at Yorktown.

In 1780 he married a daughter of General Schuyler, who was a member of a powerful New Sentification who was a member of a powerful New York family. On the termination of the war he left the service with the rank of colonel, and, betaking himself to legal studies, soon became one of the most eminent lawyers in New York. In 1782 he was returned to congress by the state of New York. But there was as yet no national government nor any power higher than that of the several states, which were now nearly bankrupt; and in 1786 Hamilton took the leading part in the deliberations of the inter-state commercial convention at Annapolis, which prepared the way for the great convention that met at Philadelphia in the following year for the purpose of revising the articles of confederation. There, although his own plan for the formation of an aristocratic republic was set aside, the spirit of his system was to a large extent adopted. But Hamilton's best work for the constitution was done after the convention was dissolved. He conceived and started the famous series of essays which originally appeared in a New York journal, and which were afterwards collected under the title of The Federalist. Fifty-one ont of the eighty-five essays were the work of Hamilton. They constitute the writings by which he is most widely known; they can scarcely be too highly praised for comprehensiveness, profundity, elearness, and simplicity, and their strength and value have been recognised in Europe as well as in America.

On the establishment of the new government in 1789 with Washington as president, Hamilton was appointed sacretary of the treasury. The disorder the public credit, and the deliciency of official accounts of the state treasury, rendered this office one of peculiar difficulty. In order to re-establish public credit, he carried, in the face of much opposition, a measure for the funding of the domestic debt, founded a national bank, rearranged the system of duties, and altogether showed himself to possess the genius of the great financier. Moreover, he practically organised the administration; and his reports, many of them on subjects outside the immediate seepe of his own department, exhibit his profound ability as a statesman. In 1795 he resigned his office, and resumed the practice of law in New York, where he was still constantly consulted by Washington and by his cabinet. He was the

actual leader of the Federal (q.v.) party until his death, and was foremost in the ficrce party strife of 1801. His successful efforts to thwart the ambition 1801. His successful efforts to thwart the ambition of his personal rival, Aaron Burr (q.v.), finally involved him in a duel with him. Hamilton had reason to regard the practice of duelling with especial abhorrence, but he appears to have felt under an obligation to accept the challenge; and on the morning of 11th July 1804 they met on the west bank of the Hudson, on the same spot where Hamilton's cldest son had received his deathwound in a duel three years before. Hamilton was mortally wounded, and died the next day, leaving the nation his indignant mourners, and his slayer mortally wounded, and then the next day, reaving the nation his indignant monrners, and his slayer for the time an exile. Hamilton's errors, like his strength, arose largely from his strong, masterful will and passionate nature. The immediate effects of his brilliant services at a crisis in his country's fate endure to this day; his influence is stamped on every page of the American constitution; and his writings still impress the reader by their vicour, their learning, and the maturity of taon; and his writings still impress the reader by their vigour, their learning, and the naturity of intellect they display. His works, exclusive of The Federalist, were edited by his son, John C. Hamilton (7 vols. 1851), who also published a Life (2 vols. 1834-40). See Riethmüller's eulogistic Hamilton and his Contemporaries (Lond. 1864), and Lives by Morse (1876), Shea (1879), and Henry Cabot Lodge ('American Statesmen' series, 1882); Lodge has also edited Hamilton's Complete Works (9 vols. 1885).

Hamilton, Anthony, Count, a cadet of the Abereom branch of the Scottish family of Hamilton, was born in Ireland in 1646. Except for the years passed at the court of Charles II., between the Restoration and the accession of James II., his life was spent in France He died at St Germain on-Laye, 6th August 1720. His writings are full of wit and talent, particularly his Contes de Fécrie (3 vols. Paris, 1805; Eng. trans. 1849). For his Mémoires du Comte de Gramont, see GRAMONT,

Mamilton, ELIZABETH, authoress, was born of a Scottish family at Belfast in 1758, and, after or a Scottish family at Iselast in 1768, and, after residing in various parts of Scotland and in London, died at Edinburgh, 23d July 1816. Her works comprise Letters of a Hindoo Rajah (1796); Memoirs of Modern Philosophers (1800); Letters on Education (1802); Life of Agrippina (1804); Letters on the Moral and Religious Principle (1806); and—the work by which she is best known—The Cottagers of Glenburnic (1808), a singularly vivid and life-like representation of lumble rural life in Scotland lumble rural life in Scotland,

Hamilton, EMMA, LADY, was born Amy Lyon or 'Hart,' most likely at Ness, in Cheshire, and on 26th April 1763. Her girlhood was passed at Hawarden. She had had three places in London, lead here that the children three places. had borne two children to a navy captain and a baronet, and had posed as Hygeia in a quaek-doctor's 'Temple of Health,' when in 1782 she accepted the protection of the Hon. Charles Greville (1749–1809), to exchange it in 1786 for that of his nucle, Sir William Hamilton (1730–1803). After five years at Naples, in 1791 she was married at Marylchone Church to her elderly ambassador, and, marytenone climen to her enterly annassator, and, returning to Italy, was straightway admitted to the closest intimacy by Maria Caroline, the queen of Ferdinand I. (q.v.). Her 'eminent services' to the British fleet during 1796-98 in furnishing information and procuring supplies were extolled by Nelson, vaunted by herself, as deserving of peerage and pension; but they were much overrated, where, indeed, not purely inaginary. Nelson had first met her in 1793; and gradually Platonic friendship ringed to only passion until four months ship ripened to gnilty passion, until, four months after the trio's return to England, she gave birth to

a daughter (1801-81), 'our loved Horatia,' so Nelson writes of her in a holograph letter to 'my own dear Wife, in my eyes and the face of Heaven.' Her eredulous husband's death, followed four years later by Nelson's, left Emma mistress of good £2000 a year; but by 1808 she was owing £18,000, and in 1813 was arrested for debt. Next year she escaped to Calais, where she died in penury, 15th January 1815. Her grave is obliterated; but her lovelines lives still in twenty-four portraits by Romney, to whom she was ever the 'divine lady.'

See Nelson; Hamilton, Sir William; Royney; the spiteful Memoirs of Lady Hamilton (1815); the 'vindication' in Paget's Paradoxes and Puzzles (1874); and J. Cordy Jealireson's Lady Hamilton and Lord Nelson (2 vols. 1888).

Hamilton, James, an English merchant, born at London in 1769, who, having been taught German at Hamburg in 1798 by an original method, afterwards exchanged mercantile pursuits for the teaching of languages, and taught with great sucteaching of languages, and taging with great success in the United States (from 1814) and in England (from 1823). He died at Dublin, 31st October 1831. Hamilton discarded grammar, using in its stead a literal word for word translation, placed immediately below the original, line for line alternately. His own account of it is to be found in The Principles, Practices, and Results of the Hamiltonian System (Manchester, 1829).

Hamilton, PATRICK, 'the protomartyr of the Hamilton, F.Arrick, the protonary of the Scottish Reformation, was the son of Sir Patrick Hamilton of Kincavel (Linlithgowshire) and Stanelhouse (Lanark-hire) and Catherine Stewart, daughter of Alexander, Duke of Albany, second son of James II. Both his parents were illegitimate. The exact date and place of his birth are unknown. Both are approximately settled, however, by the fact that he oradinated as Mactor of ever, by the fact that he graduated as Master of Arts in the university of Paris in 1520—the place of his birth being noted as 'the diacese of Glasgow'. Ag that decree could not be the diacese of Glasgow'. gow.' As that degree could not be taken at Paris hefore the age of twenty-one, we may conjecture that Hamilton was born in the last years of the 15th century. It is also unknown where he received the elements of his education. His university the elements of his education. His university studies seem to have been first conducted at Paris, where, about the time of his residence, the opinions of Luther were already beginning to attract atten-tion. It may be considered the most decisive proof that Hamilton was open to the best lights of the time that on leaving Paris he proceeded to the university of Louvain, where in 1517, under the direction of Erasmus, a college was founded for the traduct of Louis Carolina and Holyan, The found study of Latin, Greek, and Hebrew. The foundation of such a college at so carly a date in the 16th century was a remarkable innovation in university studies, and the students who availed themselves of it were only such as were in ardent sympathy with the new intellectual and religious ideals of the time. In 1523 we find Hamilton at the unithe time. versity of St Andrews, where his sympathies with Lutheranism soon brought him under the suspicion of the church authorities. To escape the fate which afterwards overtook him he returned to the Continent (1527). After a brief stay at Wittenberg, where he probably saw Luther and Melanchthon, he settled for some months in Marburg, the seat of a university lately founded in the interest of the Reformed doctrines. At Marburg Hamilton wrote (in Latin) the only production of his which has come down to us—a series of theological pro-positions known as 'Patrick's Places.' In these In these propositions the main doctrines of the Lutheran reformers are stated with such boldness and precision that Knox has embodied them in his history of the Reformation in Scotland. Hamilton returned to Seotland in the autumn of 1527, and shortly afterwards married. The next year he was summoned to St Andrews by Archbishop Beaton, uncle of the famous cardinal, and on a renewed charge of heresy was burned at the stake before the gate of St Salvator's College, 29th February 1528. His death probably did more to extend the Reformation in Scotland than even his life could have done. The reek of Master Patrick Hamilton, said one of Beaton's own retainers, 'has infected as many as it did blow upon.

A peculiar interest has always attached to the name of Patrick Hamilton. His winning personal character, his cageniess for all the hest light of his time, his conrage, and his early death make him one of the most interesting figures in the religious revolution of Scotland during the 16th century. His martyrdom also gave a distinct impulse to the doctrines for which he died; and Kuax bimself, in the most emphatic manner, testifies to Hamilton's importance in the history of the Scottish Reforma-

See Professor Lorimer's Patrick Hamilton, the first Preacher and Martyr of the Scottish Reformation (1857), and Dr David Laing's edition of Knox's History of the

Reformation in Scotland,

Hamilton, William, a Scotch poet, was burn in 1704, most probably at his father's estate of Bangonr, near Uphall, Linlithgowshire. He contributed to Ramsay's Tea-table Miscellany (1724), and joined in the second Jacobite rising. On its and joined in the second Jacobite rising. On its collapse he escaped to France, but was permitted to return in 1749 and to succeed to the family estate the year after. He died at Lyons, 25th March 1754. The first collection of his poons was issned, without his consent, by Foulis of Glasgow in 1748; a fuller collection, with a portrait, appeared under the care of his friends in 1760. One of his poems alone—'The Braes of Yarrow' will keep his name from ever being forgotten, by the depth and truth of its unsought pathos. See Junes Paterson, The Poems and Songs of William Hamilton (1850).

Hamilton, WILLIAM (TERARD (1729-96), earned the epithet of 'single-speech Hamilton' by a speech made in the House of Commons, November 13, 1754, as M. P. for Petersfield in Hants—the only speech he ever addressed to the House. For twenty years he was Chancellor of the Irish Exchequer, and was by some regarded as the author of the letters of Junius (q.v.).

Hamilton, SIR WILLIAM, grandson of the third Duke of Hamilton, was born in 1730, and in 1758, after eleven years' service in the Foot Gnards, married a beautiful Pembrokeshire heiress, with 25000 a year, who died in 1782, an only daughter having predeceased her. He was British ambassador at the court of Naples from 1764 till 1800, and in 1772 was made a knight of the Bath. During his residence in Italy he took an active part in the excavation of Herculaneum and Pompeii, and formed a rare collection of antiquities, which was afterwards purchased for the British Museum. He was anthor of several sumptuous works-Antiquités Etrusques, Greeques, et Romaines, tirés du cabinet de M. Hamilton (4 vols. Naples, 1766-67); Observa-tions on Mount Vesuvius (1772); Campi Phlegrai (Naples, 1776-77), &c. He died 6th April 1803. See Hamilton (EMMA, Lady).

Hamilton, SIR WILLIAM, of Preston, the most learned and scientific philosopher of the Scottish school, was born March 8, 1788, at Glasgow, where his father, Dr William Hamilton, and his grandfather, Dr Thomas Hamilton, held the chairs of Anatomy and Botany. Though the Hamiltons of Preston, in Haddingtonshire, who were raised to a harmetcy in 1673, had not assumed their title since the death of Sir William Hamilton in Nevember 1688, when his brother and heir, Sir

Robert, the Covenanter, refused to take the oath to legislate, the philosopher made good his claim to represent them, and therefore to be descended from the leader of the Covenanters at Bothwell Bridge. After gaining high distinction, especially in the philosophical classes, at Glasgow, he went in 1809 to Balliel College, Oxford, as a Snell exhibitioner. He graduated with first-class honours in 1810; and it was here that he laid the basis of his vast erudition in medieval and modern, as well as was called to the Scottish har in 1813; but he seems never to have had any practice in his profession except what became incumbent on him on being appointed crown-solicitor of the Court of Teinds. In 1820, on the death of Dr Brown, he was an munceessful competitor for the chair of Moral Philosophy in Edinburgh; in 1821 he was appointed to the professorship of History.

Ilamilton had now reached his thirtieth year

without giving to the world any indication of those speculations which he had been silently and slowly maturing. But in 1829 there appeared in the Edinburgh Review a critique of Cousin's Cours de Philosophie of the previous year, in which was developed that philosopher's doctrine of the Infinite. The critique immediately excited admiration both at home and abroad, and for some years after this Hamilton was a regular contributor to after this trainition was it regimer contributor to the Edinburgh Review. Besides other philosophical articles, two of which, on the Philosophy of Per-ception and on Recent Publications in Logical Science, are especially columnted, he contributed several papers on education and university reform. several papers on education and university reform. Many of these contributions were translated into German, French, and Italian; and in 1852 they were all edited by Hamilton himself, with notes and appendices, under the title of Discussions in Philosophy and Literature, Education, and University Reform. In 1836 Hamilton was elected to the chair of Logic and Metaphysics in Edinburgh. During his first session he delivered a course of legenres on metaphysics, which was followed in the lectures on metaphysics, which was followed in the succeeding session by a course on logic; and these two courses he continued to read each alternate year till the close of his life. His influence soon hegan to show itself in the university among the young men who were attracted thither from different parts of Scotland, and other compries, in many cases chicily for the sake of hearing Hamilton. Extensive notes of his lectures were taken by his students, and unprerons copies of them, transcribed from shorthand reports, were in circulation during the later years of his life. After his death these were published under the editorship of Professors ware published under the editorship of Professors Mansel and Veiteh (Sir William Hamilton's Lectures, 4 vols. 1859-61). These lectures, which were mostly written during the enrrency of the sessions in which they were first delivered, want the exactness of thought and expression which would be himself for which mark the works revised by himself for publica-tion; and it is to be regretted that the materials embadied in these valunies were not wrought into eniodited in these values were not wronger into another work which Hamilton had planued. This was his edition of the works of Reid, with notes and supplementary dissertations. The general aim of Hamilton's whole philosophy is, in fact, but the special aim of this edition of Reid (1846; additional notes from Hamilton's MSS, by Mansel, 1862). His conviction was that the philesophy of Common Sense (q.v.) represents the highest reaches of human speculation; and he accordingly sought in his annotations of Roid's writings, as in his independent works, to point out the relation of the Scottish philosophy to the systems of other countries, as well as to translate it into a more scientific expression. His labour on Reid was interrupted by ill-health. By the paralysis of his whole right side, though his mind continued unimpaired, his power of work was seriously curtailed during the later years of his life. He nevertheless produced a new edition of Dugald Stewart's works in 1854-55; and he was generally able, with an assistant, to perform the duties of his class till the close of session 1855-56, when his health suddenly became worse, and he died 6th May.

Hamilton's system professes to be merely an explication of the Scottish philosophy; it may, however, be questioned whether all his exegetical skill has vindicated the position claimed for Reid, whether, therefore, it would not have been better for Hamilton had he struck into a separate path. For while his philosophy is distinguished in general from previous Scottish speculations by its more rigorously systematic character, it ventures, as in his doctrine of the conditioned, into wholly new realms of thought. This doctrine, which limits positive thought to the conditioned sphere between the contradictory poles of the infinite and the absolute, attracted more attention than any of his other doctrines, especially after the publication of Mansel's Bampton Lectures in 1858 (see Conditions). Hamilton's contributions to logic may be reduced to the two principles (1) of distinguishing reasoning in that of comprehension, from which issues his twofold determination of major, minor, and middle terms, and of major and minor premises; and (2) of stating explicitly what is thought implicitly; whence were derived the 'quantification of the predicate,' the reduction of the modes of conversion to one, and his numerous simplifications in the laws of syllogism. See Life by Veitch (1860); short monographs by Veitch (1882) and Monck (1881); and Seth's Scottish Philosophy (new ed. 1890).

Hamilton, Sir William Rowan, one of the few roally great mathematicians of the 19th century, was horn in Dublin on August 3-4, 1805. From his infancy he displayed extraordinary talents, and at thirteen had a good knowledge of thirteen languages. Having at an unusually early age taken to the study of mathematics, in his fifteenth year he had mastered thoroughly all the ordinary university course, and commenced original investigations of so promising a kind that Dr Brinkley, himself a very good mathematician, took him under his especial patronage. His earlier essays connected with caustics and contact of curves grew by degrees into an elaborate treatise on the Theory of Systems of Rays, published by the Royal Irish Academy in 1828. To this he added various supplements, in the last of which, published in 1833, he predicted the existence of the two kinds of conical refraction the experimental verification of which by Lloyd still forms one of the most convincing proofs of the truth of the Undulatory Theory of Light. The great feature of his Systems of Rays is the employment of a single function, upon whose differential coefficients (taken on various hypotheses) the whole of any optical problem is made to depend. He seems to have been led by this to his next great work, A General Method in Dynamics, published in the Philosophical Transactions for 1834. Here, again, the whole of any dynamical problem is made to depend upon a single function and its differential coefficients. This paper produced a profound sensation, especially among continental mathematicians. Jacobi of Königsberg took up the purely mathematical side of Hamilton's method, and considerably extended it; and of late years the dynamical part has been richly commented on and elaborated by mathematicians of all nations, all uniting in their admiration of the genius displayed in the original papers. For these researches Hamilton was elected an honorary member of the

Academy of St Petersburg, a mre and coveted distinction. The principle of varying action, which forms the main feature of the memoirs, is hardly capable, at all events in few words, of popular explanation. Among Hamilton's other works, which are very numerons, we may mention particularly a very general Theorem in the Separation of Symbols in Finite Differences, his great paper on Fluctuating Functions, and his Examination of Abel's Argument concerning the Impossibility of solving the General Equation of the Fifth Degree.

We may also particularly allude to his memoir on Algebra as the Science of Pure Time, one of the first steps to his grand invention of quaternions. The steps by which he was led to this latter investigation, which will certainly when better known give him even a greater reputation than

We may also particularly allude to his memoir on Algebra as the Science of Purc Time, one of the first steps to his grand invention of quaternions. The steps by which he was led to this latter investigation, which will certainly when better known give him even a greater reputation than conical refraction or varying action has done, will be more properly treated under QUATERNIONS. On the latter subject he published in 1853 a large volume of Lectures, which, as the maided work of one man in a few years, has perhaps hardly been surpassed. Another immense volume on the same subject, containing his more recent improvements and extensions of his calculus, as well as a somewhat modified view of the general theory, was published after his death, which took place 2d September 1865.

While yet an undergraduate of Trinity College, Dublin, he was appointed in 1827 successor to Dr

While yet an undergraduate of Trinity College, Dublin, he was appointed in 1827 successor to Dr Brinkley in the Andrews chair of Astronomy in the university of Dublin, to which is attached the astronomer-royalship of Ireland. This post he held till his death. In 1835 he was knighted on his delivering the address as secretary to the British Association for its Dublin meeting. He occupied for many years the post of president of the Royal Irish Academy; he was an honorary member of most of the great scientific academies of Europe. He held during his life, not in Dublin alone, but in the world of science, a position as merited as it was distinguished. See his Life by Graves (3 vols. 1883-89).

Hamilton Group, a subdivision of the upper Devonian strata of New York.

Hamiltonian System. See Hamilton (James).

Hamlet, the hero of Shakespeare's greatest tragedy, but whether a figure originally historical, mythological, or partly both, still remains uncertain. The legend of Amleth is first found in the third and fourth books of the Latin history of Denmark by Saxo Grammatiens, written about the end of the 12th century, but first printed at Paris in 1514. According to this version, Gervendill, the governor of Jutland under Rörik, king of Denmark, leaves two sons, Horvendill and Fengo. Horvendill for a brave exploit is rewarded with the hand of Gerutha, Rörik's daughter, who hears him a son, Annleth. Fengo nurders his brother, and then prevails upon Gerutha to marry him by persuading her that he had done this crime nerely out of love for her. Annleth to save his life feigns madness, and is put to some strange tests by his suspicious uncle. He is finally sent to England with two attendants, bearing a scaled letter instructing the king to put him to death, but he contrives to alter the writing so as to procure for them death, and for himself an honourable reception. He next marries the king's daughter, and returns after a year to Denmark, burns down the banqueting hall, together with its drunken revellers, and slays Fengo with his own sword. He next revisits England, but, as his father in-law and Fengo had had a secret agreement that the survivor should avenge the other's death if caused by violence, he is sent for his own doom to Scotland to woo the queen

Hermuthrnda, who had killed all former suitors. But the terrible queen herself falls in love with the hero, whose final fate is to fall in battle with Vikletns, the successor of Rorik. The interest of the story for students of Shakespeare ends with Saxo's third book, which brings it down to the

death of Fengo.

The story of Hamlet was freely translated in the fifth volume of François de Belleforest's Histoires Tragiques (1570), and a rough but literal English Translation of this exists in a single copy (once Edward Capell's) in the library of Trinity College, Cambridge, entitled The Hystoric of Humblet (London, 1608; reprinted in Collier's 'Shake-speare Library,' 1841). Dr Latham in his Dissertations on Humblet (1872) contends that the hero in Saxo's third book is a different personage from that is the fourth, the former being identical with on the fourth, the former being identical with Olaf Kyrre, the Anlaf Cwian of the Sacon Chronicle, and the Anlaf Cuaran of the Irish Annals; the latter, with the Hygelac of Beownlf, and the Chocilaiens of Gregory of Toms. The inquiry into the mythological genesis of the story is more entertaining than profitable, and may be pursued by the curious in Zinzow's book, Die Humletsage an und mit verwandten Sagen erlanlert (Halle, 1877). For the whole question, see Simrock's Quellen des Shakespearer (1870), Moltke's Shakespeares Hamlet-Quellen (Leip, 1881), and G. P. Hansen's Legend of Hamlet (Chicago, 1887).

Hamlin, HANNIBAL, an American statesman, was born in Patis, Maino, 27th August 1809, practised law from 1833 to 1848, was speaker of the state-house of representatives in 1837-39 and 1840, and was returned to congress in 1842 and 1844. He sat in the United States senate as a Democrat in 1848 57, when he was elected governments nor by the Republicans, having separated from his party owing to his anti-slavely apinions, which, however, were limited to an opposition to the extension of slavery to new territories. In the same year, 1857, he resigned to return to the senate; and in 1861 he became vice-president of the United States under Lincoln. He served in the senate again from 1869 till 1881, and in 1881-82 was minister to Spain.

Hamm, a town of Prussia, in Westphalia, on the Lippe, 25 miles NE. of Dortmund by rail, has large metal industries, including iron-foundries, wire-works, manufactories of machines, iron furniture, &c. Hamm was formerly one of the Hamse towns, and until 1763 a fortress of some importance. Pop. (1875) 18,904; (1885) 22,523.

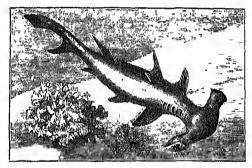
Hammer, a tool used for applying the force of impact, either for the purpose of beating malleable materials into a required form, or for driving nails, wedges, &c. A multitude of modifications in the form of hammers are made to suit different kinds

For many purposes hammers are required of greater weight than a man can wield; and a great variety of power-hammers are used. These, for the most part, are masses of iron raised by steam or other power and then allowed to fall by their own gravity upon the work. The helve or skingling hummer, used for compressing the mass of iron drawn from the puddling furnace, and the tilt-hummer, used in the manufacture of shear-stool, are important examples of such hammers. first is a heavy bar of cast iron about ten feet long, weighing three or four tons and npwards, to which weighing nearly half a ton more. It works upon an axis at the end of the bar farthest from the head, and is raised by cams attached to a heavy whose set in motion by steam or water power; these cams strike or 'lick' a projection extending

beyond the head, and thus raise it about 18 or 20 inches at the rate of from seventy to one hundred times per minute. The tilt-hammer is similar, but much lighter, and is adapted for striking above three hundred blows per minute. In order to attain this velocity a short 'tail' extends with a downward inclination beyond the axis, and the cams strike this downwards, and thus lift the longer arm of the lever to which the head is attached. These, when worked by steam, are, of course, steam-hammers; but when the term steam-hammer is used without qualification, it applies to another and more clab orate machine of very different construction. See STEAM-HAMMUR.

Hammeriest, the most northern town of Europe, is situated in 70° 40′ N. lat. and 23° 30′ E. long, on the island of Kvalo, in the Norwegian province of Finnark. It is the rendezvous of the fishing fleets of the Kara Sea and the waters along the Spitzbergen coasts. It imports coal, salt, hemp, thour, &e. in exchange for fish and fish-oil, with some reindeer hides, eider-down, and fox-skins. During the two summer months the sun is continually above the horizon. The winter is mild enough to allow of the fisheries being carried on. Pop. 2289.

Hammer-head, or HAMMER-HEADED SHARK (Zyyama), a genus of fishes of the family of Sharks, having the general form and characters of the family, but distinguished from all other fishes by the unusual form of the head, which, resembling a doubleheaded hammer laid flat, extends on both sides to



Hammer-head (Zygiena midlens).

a considerable length, carrying the eyes at the ends of the lateral expansions. The crescent shaped of the lateral expansions. month is below the centre of the head, the nostrils

are on the front edge of the head, and the eyes are covered by an eyelid or nictitating membrane. In young specimens the hammer-headed shape is not so well developed as in adults. The luminerheads bring forth their yonug alive. In one long, thirty-seven embryos were found. There are live known species,



Under side of the head,

all of them being most abundant in the tropies.

Z. malleus, by far the most common form, occurs in nearly all tropical and subtropical seas. In the tropics specimens of this species 'may often be seen ascending from the clear blue depths of the ocean like a great cloud.' Some large ones, one over 13 feet long, have been taken on the British coasts.

Hammer-Purgstall, Joseph, Freiherr von, orientalist, was born at Gratz, 9th July 1774, studied at Vienna, and lived from 1799 to 1806 as interpreter at Constantinople, afterwards becoming a court councillor at Vienna. He was ennobled in 1835 on succeeding by inheritance to the Styrian estates of the Conntess von Purgstall, the last of her race. He died at Vienna, 23d November 1856. He had a wide but rather superficial knowledge of Turkish, Arabic, Persian, and other eastern languages, and his industry and zeal did much to push forward the good work of opening up the East to the West. Of his books may be named, in the region of history, Geschichte der Assassmen (1818); Geschichte des Osman. Reichs (2d ed. 1834–36); Geschichte der Ilehane (1843); Gesch. der Chune der Krim (1856); in that of literary history, Gesch. der Osman. Dichtkunst (1836–38); Litteraturgeschichte der Araber (1850–57). See Schlottmann's Life (1857).

Hammersmith, a parliamentary borough (since 1885) of Middlesex, is situated on the Thames. A suspension bridge was opened here in 1827, and a new one by Prince Albert Victor in June 1887. The borough returns one member to parliament. Formerly a detached village, Hammersmith is now a large town, and forms part of West London. Pop. (1851) 17,760; (1881) 71,939.

Hammock (Spanish hamaca, a West Indian word), the apparatus in which a sailor slings his bed. A sailor's hammock consists of a piece of hempen cloth or of strong netting, about 6 feet long and 3 in width, gathered together at each end, and hung to hooks under the deck. Hammocks of netting are often swing hou thees in parks and gardens as a pleasant place for idling in fine weather.

Hammond, Henry, English divine and controversial writer, was born at Chertsey, Surrey, Angust 26, 1603, and educated at Eton, and Magdalen College, Oxford. In 1633 he was presented to the rectory of Penshunst, in Kent, and ten years later was made archdeacon of Chichester. But his loyal adhesion to the cause of Charles I. cost him his living; yet he officiated as chaplain to the king till his attendants were dismissed in 1647. Hammond then returned to Oxford, and was chosen sub-dean of Christchurch. Deprived by the parliamentary commissioners in 1648, he shortly after retired to Westwood in Worcestershire, where he died April 25, 1660. His celebrated work, the Paraphrase and Annotations on the New Testament, was published in 1653 (new ed. 4 vols. 1845). His collected works with biography were published in 4 vols. 1674-84. His Paranesis was edited by Manning in 1841. The Sermons were reprinted in 1851, the Minor Theological Works in 1849, both in the Oxford Library of Anglo-Catholic Theology. Bishop Fell's Life (1661) is reprinted in Wordsworth's Eccles. Biog., vol. iv.

Hamoaze. See Plymoutii.

Hamoon. See Seistan (Lake of).

Hampden, John, English statesman and patriot, was the eldest son of William Hampden of Hampden, in Buckingham, by Elizabeth, second daughter of Sir Henry Cromwell of Hinchinbrooke, Huntingdonshine, and aunt of Oliver Cromwell. He was born, it is believed, in London, in 1594. He received his early education at the grammar-school of Thame, and proceeded in 1609 to Magdalen College, Oxford. Four years later he became a student of the Inner Temple, London. But his father's death, when he was only three years of age, had left him the master of a considerable estate, and he does not appear to have practised as a barrister. In 1619 he married Elizabeth Symeon, a lady to whom he was much attached; 'on a sudden,' according to Clarendon, 'from a life of

great pleasure and license, he retired to extraordinary sobilety and strictness, to a more reserved and melancholy society.' But, although he became in all essentials a Pinitun, he never ceased to be a polished country gentleman. In January 1621 he entered parliament as member for the borough of Grampound, a scat which he subsequently exchanged for Wendover, and at once entered the ranks of the parliamentary opposition, of which the recognised leaders were Pym, Eliot, Oliver St John, and Coke. Although he was no orator—it is believed that in the first five paliaments in which he sat he never opened his month—his judgment, veracity, and high character seenred for him a leading position in the ranks of his party. In 1626 he helped to prepare the charges against Bucking-ham; the following year, having refused to pay the proportion of the general loan which Charles at-tempted to raise on his own authority, he was con-fined in the Catchonse and subsequently in Hampshire, to be released on Charles finding it necessary to summon a new parliament. His leading political associates were Pym, whom he regarded as his associates were rym, whom he leganded as his leader in the House of Commons, and Sir John Eliot, who was his personal friend, and after the interests of whose children he looked at the time that their father was in prison. When Charles dissolved parliament in 1629, Hampden retired to his seat in Buckinghamshire, and gave himself up to the absence and duties of a real life afterness. to the pleasmes and duties of a rmal life, although he neglected neither his friends, his country, nor his favourite political studies. In 1634 his wife, who had borne him nine children, died. The same year Charles resorted to the impost of ship-money, as an evidence of the right which he claimed to tax the country in any way he chose, and although he confined its incidence at hist to London and the maritime towns, in 1686 he extended it to inland places. Hampden refused to pay his share of the impost, and in 1637 he was prosecuted before the Court of Exchequer for non-payment. Seven of the twelve judges sided against him, but, as Mr S. R. Gardiner has said, 'the councition between the rights of property and the parliamentary system was firmly established. The prosecution also made Hampden the most popular man not only in the ranks of the parliamentary opposition but in England—a position which he never lost, although he still played a secondary part to Pym in the House of Commons. He was a member both of the Short Parliament, which opposed Charles and Strafford in connection with the war with Scotland, and of the much more memorable Long Parliament, for which he was returned by the electors both of Wendover and of Buckinghamshire, although he elected to sit for the county. He had indeed not a little to do with giving this remarkable body its character, as before the election took place he rode from county to county exhorting the cleetors to give their votes to men worthy of their confidence.

Hampden at once took a foremost place in the new House. 'The eyes of all men were fixed upon him,' says Clarendon, 'as their patrice pater, and the pilot that must steer the vessel through the tempests and rucks which threatened it.' He took part in almost all the leading transactions of the Long Parliament, especially in the action which ended in the death of Stratford, although he seems to have been of opinion that proceeding by bill was nnnecessary, and that the better course would have been to obtain judgment on the impeachment. Had the abortive negotiations between Charles and the leaders of the opposition come to anything, it is understood that the post of tutor to the Prince of Wales would have been offered to Hampden. Still he had never any faith in the king, and when, through the formation of a party of constitutional royalists in the Commons itself with Lord

Falkland at its head, it seemed not impossible that Churles would be able to eansh the liberties of his country, Hampden, like his relative Cromwell, meditated self-exile to New England, not for the meditated self-exile to New England, not for the first time in the course of his public life. In the debate on the address to the king, known as the Grand Remonstrance, it was the calmuss of Hampden which prevented the two parties in the House from fighting on its floor. He was one of the two members, Charles's attempt to seize whom, when engaged in the discharge of their parliamentary duties on January 4, 1642, precipitated the Civil War.

When hostilities broke out, Hampden subscribed £2000 to the public service, took a colonel's commission in the parliamentary army, and raised a regiment of infantry in his own county of Bucking-ham. He attended to his military as to his parliamentary duties with energy and promptitude, and on various occasions, as at the battle of Edgelill and the assault and capture of Reading, he exhibited both personal bravery and generalship. He was, however, placed under Essex, and although he pro-tested against his chief's hesitation, he was powerless to avert its consequences. He heartily approved of, to avert its consequences. He hoardly approved of, and to a certain extent anticipated, the suggestions made by Cromwell which ultimately resulted in the conversion of the parliamentary forces, under the designation of the 'new model,' into an invincible army. On the 18th June 1643, while endeavouring, on Chalgrove Field, near Thame, to check a marauding force under the command of Prince Rapert, he was struck in the shoulder by two balls. tapert, ne was struck in the shoulder by two balls. He was able to reach Thame, and there he lingered till the 24th. Hamplen has left behind him the reputation of heing the most moderate, tactical, nrbane, and single-minded of the leaders of the Long Parliament, while inferior to none in resolution or sincerity. He showed before such capacity. He showed before his death such capacity both as a statesman and a soldier as to justify Macaulay in predicting that if he had lived he would have been the Washington of

The standard biography of Hampden is Lord Nugent's Memorials of Hampden (1831). Among the numerous works in which he forms a prominent figure are Clarendon's History of the Rebellion (1702-4); S. R. Gardiner's History of England and History of the Great Givil War (1883-89); and John Forster's Arrest of the Five Members (1860) and Ser John Eliot (2d ed. 1871). See also Calltern Iffile; and for reasons for rejecting the commonly accepted account of his death, see two letters by C. H. Firth in the Academy, November 2-9, 1889.

Hampden, RENN DICKSON, theologian and bishop, was born in Barbadoes in 1793, studied at Oriel College, Oxford, taking a double first in 1813, and becenning in due course Fellow and tutor of his college. In 1829 his favorary Province. of his college. In 1832 his famous Bampton lectures on the Scholastic Philosophy considered in its Rela-tion to Christian Theology were by great part of the church considered grievously heretical, and raised a controversy that threatened to break up the Church of England. His successive appointments to the principalship of St Mary's Hall (1833), the chairs of Moral Philosophy (1834) and of Divinity (1886), were denounced successively by the strong party led by Wilberforce, and his elevation to the see of Hereford in 1847 was by it regarded as a death-blow to Trinitarian religion. Yet Bishop Hampden's works may now be regarded as innocent and edifying. After an episcopate of studions quiet, he died at London, 23d April 1868. Of his books may be named his Work of Christ and the Spirit (1847), Lectures on Moral Philosophy (1856), and Fathers of Greek Philosophy (1862). See H. Hampden's Some Memorials (1871), and, for the Hampden controversy, Stanley's Life of Arnold.

Hampole, RICHARD ROLLE, known as the Hermit of Hampole, was born about 1290 at Thornton in Yorkshire. Scut to Oxford by Neville, archdeacon of Durham, he made great progress in his studies, and at nineteen assumed a hermit's dress, and gave his life entirely to the austerities of religion and to writing, down to his death in 1349, when he was buried in the Cistercian number of Hampole near Doncaster. He wrote religious books both in Latin and in English, and rendered the Psalms into Laufin and in English, and reacerecture realism into English prose. His great work is The Pricke of Conscience (Stimulus Conscientiae), a poem written both in English and Latin. The English version contains 9624 lines on the instability of life, death, purgatory, documeday, the pains of hell, and the joys of heaven. It was edited by Dr Richard Morris in 1863 for the Philological Society. A small collection of Hampole's prose pieces was edited by the Rev. G. G. Perry for the Early English Text Society in 1866. See also the papers by J. Ullmann in vol. vii., and G. Kribel in vol. viii., of *Englische* Studien.

Hampshire, Hants, or, officially, the county of Southampton, a maritime county in the seuth of England, is bounded W. by Dorset and Wilts, of England, is bounded W. by Dorset and Wilts, N. by Berks, E. by Surrey and Sussex, and S. by the English Channel. The county, including the Islo of Wight, has an area of 1621 sq. m., or 1,037,764 acres, 700,000 of which are generally nudor culture. Pop. (1801) 219,200; (1841) 354,682; (1861) 481,815; (1871) 544,684; (1881) 503,470. The surface is diversified by the North and South Downs, the loftiest points being Sidown Hill (940 feet) and, on the Berkshire border, Juken Peacen. feet), and, on the Berkshire border, Inkpen Beacon (1011 feet), the highest chalk-down in England. The south-western portion of the county, almost wholly detached from the main portion by the South-ampton Water, is occupied mainly by the New Forest, 92,365 acres in extent, the property of the orost, 12,303 acres in extent, the property of the crown. In the south-east and east there are remains of the forests of Bere, Woolmer, and Waltham Chaec. The principal rivers are the Test, the Itchen, and the Avon, all flowing southward; the last named forms the western boundary of the New Forest. The climate of the county is in general with a walf forestly believed in the mild, and favourable to vagetation; indeed, in the south of the Isle of Wight it is believed to be milder than in any other portion of Great Britain. All the usual crops are produced, the wheat being especially good as a rule; hops are cultivated; and the bacon enred here is famous. The Downs afford pasturage for an excellent breed of sheep. Honey is a speciality of the county. The mainfactures are inconsiderable, except at Portsmonth and Gosport. Southampton and Portsmouth, both termini of important railways, are the chief centres of trade. The county, exclusive of the parliamentary boronghs of Portamouth, Southampten, Winchester, and Christehurch, and the 1sle of Wight, returns five members for its five divisions --North or Basingstoke, West or Andover, East or Petersfield, South or Farelian, and New Forest The county council consists of 100 members. Hampshire is wholly in the diocese of Winchester. Towns other than the four boroughs are Aldershot, Alton, Andover, Basingstoke, Bisheps Waltham, Bournemonth, Farcham, Gosport, Havant, Lymington, Petersfield, Ringwood, Romsey, and Titchfield. The chief edifices in the county possess ing historical or architectural interest are those at Winchester (q.v.); Porchester Castle, at the head of Portsmouth Harbour; Carisbrooke Castle in the Isle of Wight; Calshot and Illust Castles, now ocenpied as coastguard stations, creeted in the time of Henry VIII.; Netley and Beaulieu Abbeys, and the Priory of St Denis, all in the neighbourhood of Southampton. Hampshire is exceedingly rich in Roman remains. Among

Hampshire's worthies have been Jane Austen, Walter Besant, Charles Dickens, William Gilpin, Keble, Kingsley, Archbishop Warhan, Gilbert White, William of Wykeham, and Edward Young. See ISLE OF WIGHT, NEW FOREST; and Woodward's History of Hampshire (3 vols. 1861-69).

Hampshire Basin. See Eccene System.

Hampstead, a parliamentary borough of Middlesex, is finely situated on a range of hills 4 miles NW. of London. It was formerly famous for its medicinal springs, and is still a favourite place of residence and of holiday resort among Londoners, who are attracted to it by the heanty of its situation and the purity of its air. On the summit of the hill (430 feet), above the village, snmmit of the hill (430 feet), above the village, is the Heath, which affords extensive and pleasant prospects of the surrounding country. A house on the Heath, formerly called the Upper Flask Inn, and now a private residence, was at one time the place of resort of the famous Kit-Cat Cluh, at which Steele, Addison, Richardson, Walpole, and others used to assemble. Hampstead is associated with many names in literature and art, as those of Pope, Gay, Johnson, Akenside, Joanna Baillie, Byron, Constable, Romney, Coleridge, Keats, Shelley, Leigh Hunt, and Landscer. The borough returns one member to parliament. Pop. 45,452. See W. Howitt's Northern Heights of London (1869).

Hampton, a village of Middlesex, on the Thames, 15 miles SW. of London. In the vicinity are many fine mansions and beautiful villas, including Garrick's villa. Pop. 4776.

HAMPTON COURT PALACE, long a royal residence, and now partially occupied by persons of good family in reduced circumstances, stands about a mile from the village in the midst of grounds that extend to the Thanes. The original palace was creeted by Cardinal Wolsey, and by him presented (1508) to Hanry VIII. who enlarged it and formed (1526) to Henry VIII., who enlarged it and formed around it a royal deer-park. Here Edward VI. was born, his mother, Queen Jane Seymour, died, and Charles I. underwent a portion of his confinement. Here too was held in 1604 the famous conference between the bishops and the Presbyterians. It continued to be a royal residence down to the time of George Il. A considerable portion of it was rebuilt by William III., from designs by Wren, and he also laid out the park and gardens in the formal Dutch style. The picture-gallery contains several Italian works, Lely's Beauties of the Court of Charles II., and valuable specimens of Holbein, Kneller, West, &c. The cartoons by Raphael have been removed to the South Kensington Museum. The gardens present a series of raised terraces, formal flower-plots, and long and shady arcades, and have among other attractions a 'maze or labyrinth. Dannage, estimated at £20,000, was caused by fire in November 1886. See Ernest Law, Hampton Court in Tudor and Stuart Times (2 vols. 1885-89). HAMPTON COURT CONFERENCE, a conference

which took place at Hampton Court shortly after the accession of James I. to the throne of England, in order to the settlement of ecclesiastical disputes. Of the divines summoned the representatives of Of the divines simmoned the representatives of the High Church party were more numerous than the Puritans; the Puritans were among the least extreme of their party. Archbishop Whitgift, with eight bishops, six deans, and an archdeacon, appeared on the High Church side; two Oxford professors of divinity, two divines from Cambridge, and along with them Patrick Galloway, minister of Perth, maintained the Puritan cause. On the king's accession the Puritans, entertaining great hopes of release from the rigid enforcement of ceremonies which galled their consciences,

and of the reformation of abuses in the church, had addressed a petition to the king, known as the Millenury Petition, because it was signed by nearly one thousand ministers in all parts of the country. But the king's intention was not to comply with their wishes, and the Hampton Court Conference seems to have been merely a device for making it appear that their demands had been considered and found unreasonable. On the first day of the conference (12th January 1604) the High Church representatives alone were admitted to the presence of the king, who demanded their opinion, which they gave on the third day after, in favour of the existing system in all the parts complained of. On the 16th of January the Puntans were called to the king's presence, but along with them some of their opponents, when James debated keenly against the Puritans, and, according to his own account of the matter, 'peppered them soundly.' On the 18th of January both parties were called in, and the royal judgment intimated, which was afterwards announced in a proclamation very adverse to the Puritans. See S. ${f R}$. Gardiner's History of England.

Hampton, a town and bathing resort of Virginia, giving name to Hampton Roads, a chantel hetween Chesapeake Bay and the estnary of James River. The town contains a normal institute for colonred pupils. The channel, which is defended by Fortress Monroe, was the scene of covered pupils are always a serious during the civil way. Penseveral naval actions during the civil war. Pop. 2084.

Hampton, Wade, an American soldier, was born in South Carolina in 1754, served in the revolutionary war under Marion and Sunter, was twice elected to congre-s, and in 1809 became brigadier-general. In 1813, now a major-general, he made an unsuccessful attempt to invade Canada. He afterwards became wealthy by land speculations, and at his death in 1835 was said to own 3000 slaves.—His grandson, Wade, born in Columbia in 1818, was a state senator when the civil war becam. He raised a force of infantry cavalry. Hampton, Wade, an American soldier, was began. He raised a force of infantry, cavalry, and artillery, known as 'Hampton's Legion,' and served at Bull Rnn and in the Peniusular campaign. As brigadier-general, he commanded a cavalry force in the Maryland and Pennsylvania campaigns in 1862-63, and was severely wounded at Gettysburg. He received the command of Lee's Gettysburg. He received the command of Lee's cavalry in 1864, with the rank of lieutenant-general; and in 1865 he served in South Carolina against Sherman. He was elected governor of his state in 1876, and United States senator in 1878 and 1884.

Hamster (*Cricetus*), a genus of rodent manimals of the family Muridæ, characterised by a stoutish body, short legs and tail, cheek-pouches reaching back almost to the shoulders, five toes on the hind-foot and four toes and a thumb-wart on the fore-foot. Two incisor teeth are present in each jaw (as usual in rodents), the upper ones yellow and undivided; there are three molar teeth on either side in each jaw, which have true roots, the foremost the largest. The stomach has two divisions, and there is a large execum. There are nine species, of which the most important is the Common Hamster (Cricetus vulgaris), distributed from the Rhine to the middle of Siberia, and from 60° N. lat. to the Caucasus. It is about 1 foot in length (2 inches being occupied by the tail, which is slightly hairy); yellowish-gray above, black below, with several yellowish-white patches on the side, and with white feet. It breeds twice in the year and from four to sixteen young are won. the year, and from four to sixteen young are produced each time, which are born blind. The males especially are very pugnacions, and will defend themselves courageously to the last gasp. During

the winter the hamster hibernates, living upon its store of food. Each individual makes a burrow for itself, to which there is a vertical entrance and a sloping passage for exit. The sleeping apartment is always separate from the storehouse, of which young hamsters only make one, older ones several.



Hamster (Criccius vulgaris).

It lives upon roots, grain, and fruits, but does not disdain to eat frogs, beetles, or worms. During the summer it lays up a store of grain and pulse, which it carries home during the night in its checkponehes. Only the martitive portions of its booty are stored up, the husks and chaff being rejected; sometimes the amount of its hoard will reach nearly a hundredweight. Hence it is a great post to the farmers of the countries in which it abounds, and the object of their naccasing hostility. The skins of hamsters are of some value.

Hanaper Office, an office of the Court of Chancery, from which certain writs were formerly issued. The name is derived from the fact that the papers and writs used to be kept in a hamper (in hanaperio). The Comptrollers of the Hanaper were abolished in 1842.

Manau, a town in the Prussian province of Hesse-Nassan, is stinated at the confinence of the Kinzig and the Main, 13 milos E. by N. of Frankfort by rail. It is divided into the Old and the New Town; the latter was founded in 1597 by Protestant refugees from Holland and Belginm, who introduced the manufacture of woollen and silk goods, which still flourishes. The town of Hanau stands pre-eminent in Germany for its jewelry and gold and silver wares. Besides these it carries on manufactures of carpets, chocolate, leather, eards, paper, hats, tobacco, and gaupowder, and has broweries and an iron-foundry. Here the brothers Grimm were horn. In the neighbourhood is the watering-place of Wilhelmsbad. Hanau dates as a town from 1393. It had a very chequered history during the Thirty Years' War. Near the town was fought one of Napoleon's last battles in Germany, October 30 and 31, 1813, when he defeated the allied Anstrians and Bavarians under Wrede, Pop. (1875) 22,269; (1885) 24,379.

Mancock, Winfield Scott, a distinguished American general, was horn at Montgomery Square, near Philadelphia, 14th February 1824. His grandfather was a Scotsman, his father an attorney of good position. He graduated at West Point in 1844, served with merit through the war with Mexico, and had reached the rank of captain when the civil war broko out. Commissioned in 1861 brigadier-general of volunteors, he did good service in organising the army of the l'otomae, and was prominent in the hattles of South Mountain and Antictam; at Frodericksburg, as major-general of volunteors, he led 5000 men to the desperate assault on Marye's Heights through a doadly fire from which less than 3000 came back. In June 1863 he was given the command of the 2d corps. At Gettysburg, Hancock was in command until Meade's arrival; and on 3d July he was severely wounded, but remained on the field until the enomy's last

determined assault was repulsed by his corps. In 1864 he was conspicuous in the hard-fought battles of the Wilderness, Spottsylvania, and Cold Harbor; at Spottsylvania he captured nearly an entire division, and carried a salient of field-works on the Confederate centre, afterwards known as the 'bloody angle, which, with the help of the 6th corps, he held against Lee's desperate assaults. For this, and his services afterwards under Grant, he was created brigadier-general in the regular army, 12th August 1864. His wound now broke out again, and thereafter, while the war continued, his energies were directed mainly to the work of organisation. In 1866 he was promoted to major-general. and assigned to the command of the department of the Missouri, where he was for a time employed the Missouri, where he was for a time employed against the Indians. He was then transferred to the South, and in 1868 to the division of the Atlantic. To this post, after three years' command in Dukota, he was restored in 1872, and filled it till his death. He was the Democratic candidate for the presidency of the United States in 1880, but was defeated by Garfield (q.v.). He died on Governor's Island, in New York barbour, 9th Febraary 1886. Grant has written, 'Hancock stands the most considerant fluore of all the general editors. most conspicuous figure of all the general officers who did not exercise a separate command. McClellan called him 'superb,' and the title stack to him. He was a brave, fearless soldier, prompt in decision, and skilled to command; but one who would rather lead than send his troops forward, and whose presence in the thickest of the fight won him their confidence. See the Life by Jimkin and Norton (New York, 1880), and Walker's History of the Second Corps (1887).

Hand, The. The genus Homo, or Man, was ranked by Chvier in his classification of mammals as a distinct order, Bimana, in consequence of man being the only animal possessing two hands. Recently the tendency has been to revert to the classification of Linnaens, and to place man with all monkeys, lemurs, and bats in the order Primates (see Bimana, Mammania). At first sight it might be considered that the so-called Quadrumana or four-handed animals (monkeys, &c.) were better equipped than those which possess only two hands, but this is far from being the case. None of the four hands are adapted to the variety of actions which the human hand is capable of performing, and they are all, to some degree, required for support and locomotion; so that, while in the higher

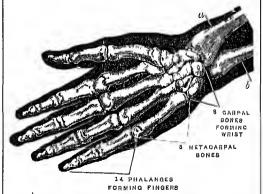


Fig. 1.—Front view of the Bones of right hand: a, radius; b, ulna.

forms of the quadramana the extremities present an approximation in structure to those of man, in the lower they gradually tond to resemble the ordinary quadrapedal type. 'That,' says Cuvier, 'which constitutes the hand, properly so called, is the

faculty of opposing the thumb to the other fingers. so as to seize upon the most minute objects-a faculty which is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be employed in prehen-The peculiar prehensile power of the human hand is chiefly dependent upon the length, power, and mobility of the thumb, which can be brought into exact opposition to the extremities of all the

fingers, whether separately or grouped together.
The general arrangement of the bones of the hand will be understood by a reference to fig. 1.

In fig. 2 we have a diagram showing the way in which the bones of the hand are arranged. The

Ū ()₁3 (i) (ii) (iii) 3 4 3

Fig. 2.—Diagram of the Bones of the Hand, with the ends of the Radiuand Ulna (after Humphry):

Himphry):
1, end of radius; 2, end
of ulua, 3, scaphold, 4,
semilumer; 5, cameform; 6, pisform; 7,
trapezium; 8, trapezoid; 9, imagium; 10,
unciform; 11, 11,
metacarpal bones; 12,
12, first row of plualanges; 18, 13, scoond
row; 14, 14, third row;
t. thumb: 1t. forefluser. i, thumb; it, forefinger, &c.; v, little finger.

carpal bones (3 to 10 in the figure) are eight in number, and are arranged in the wrist in two rows. The first or in two rows. npper row consists practically of three bones (3, 4, 5), the fourth (6) being regarded as belonging to the class of Sesa-moid Bones (q.v.), and the second row of four bones (7, 8, 9, 10); so that, excluding the pisiform bone (6), the carpal and the tarsal houes correspond in number. As we commonly term the palm the front of the hand, the thumb becomes conventionally the outer, and the little finger the inner digit; but according to the rules of comparative anatomy, and in order to com-pare the hand and foot, we ought to reverse these terms. The outer (3) of the carpal bones of the first row supports (through the intervention of 7 and 8) the bones of the thumb and forefinger (1 and II), and constitutes with them the outer division of the

hand. The inner (5) of the carpal bones bears the little and the next (the ring) finger (v and IV), and constitutes with them the *inner* division of the hand, while the middle one (4) bears the or the hand, while the initial one (4) bears the middle finger (III), and belongs to the middle division of the hand. We likewise see from this figure, and also from fig. 1, that the two onter bones (3 and 4) are connected with the radius, while the inner bone (5) is connected (indirectly by a thick ligament) with the ulma.

The carpal bones are so arranged that the carpus presents a dorsal convex surface, upon which the tendons of the extensor muscles of the fingers play, and a palmar concave surface on which the tendons of the flexor muscles lie. The several bones are joined to one another-each bone being united to three or more others—by a large extent of surface, and are girded together by strong ligamentous bands. The wrist is thus as strong as if it had been constructed of one solid piece of bone, while the slight gliding movements which occur between the several bones give it an elasticity which serves to break the shocks that result from falls upon the hand. The uppermost surface of the first row of carpal hones is convex, and this convex surface is received into a wide cup or socket, formed by the lower articular surface of the radius and by a ligament passing from that bone to the nlna. Like the great toe, the thumb has only two phalanges, while each of the other digits has three.

For the different directions in which the arm and hand collectively can be moved, see the description of the construction and movements of the shoulder and elbow joints at ARM. Movements

of the forearm and hand, to which there is virtually nothing analogous in the leg, are those of 'prona-tion and supination.' In pronation (derived from pronus, 'with the face downwards') we turn the palm of the hand downwards, as in picking up any object from the table; in supination (derived from supinus, 'with the face upwards'), we turn the palm upwards, as for the purpose of receiving anything that may be placed in it.

These movements of pronation and supination are so important to the usefulness of the hand that we must notice the muscles by which they are chiefly effected. One of these muscles passes from a projecting process on the inner side of the arm-hone at its lower end to the outer edge of the middle of the radius. Its contraction causes the radius to roll over, or in front of, the nlua. It thus pronates the hand, and is called a pronator muscle. Another crosses from the front of the lower end of the ulna to the corresponding part of the radius. Its shape and its action are indicated by the name pronator quadratus. Another muscle passes from a projecting process on the outer side of the arm-hone and from the outer aspect of the ulna to the outer surface of the radius near its upper part. It runs therefore in an opposite direction to the former muscle, and produces an opposite effect, rolling the radius and the hand back into the position of supination. Hence it is called a Hence it is called a The fourth is a very position of supination. Hence it is earlied a supinator muscle (see fig. 3). The fourth is a very powerful muscle tenned the *Biceps* (q.v.), which not only bends the elbow, but, from the mode in which its tendon is inserted into the inner side of

the radius, 'also rotates the radius so as to supmate the hand; and it gives great power to that movement. When we turn a screw, or drive a gimlet, or draw a cork, we always employ the supinating movement of the hand for the purpose; and all screws, gimlets, and im-plements of the like kind are made to turn in a manner suited to that movement of the right hand, because mechanicians have observed that we have more power to supinate the hand than to pronate it.' Supination can only be performed to its full extent by man, and even in man it is not the natural or habitual position; monkeys can partially effect the move-ment, and in most of the lower animals the part corresponding anatomically to the

of pronation.
The movements of which the hand itself, without reference to the arm, are capable, are very numerous, and in this respect differ considerably from the corresponding movements of the foot. Thus we can bend the fingers down upon the palm, or we can extend them beyond the straight line; we can separate them from one another to a considerable extent, and we can close them

hand is constantly in a state

with considerable force. The wrist and hand are bent forwards or flexed upon the forearm by three muscles which pass downwards from the inner



Fig. 3. — The super-ficial Muscles of the Forearm: bleeps; 2, tendon of biceps; 5, the radial flexor of the wrist; 6, the long palmar muscle, spreading out(at9) mto the palmar fascia; 8, the ulmar flexor of the wrist; 10, the long supinator muscle.

muscle.

condyle or expanded end of the humerus, and are termed the radial flexor, the ulnar flexor, and the long palmar muscles. The first two of these muscles are inserted into wrist-bones on the radial and ulnar sides respectively, while the third expands into a fau-like fascia or membrane in the palm of the band, and thus serves both to support the skin of the palm and to protect the nerves and vessels which lie below it. Beneath the palman fascia lie two sets of flexor muscles of the lingers, and they present so beautiful a mechanical arrangement as to merit special notice.

The superficial or perforated flexor muscle passes down the front of the forearm, and divides into four tendons, which become apparent after the removal of the palmar fascia, and are inserted into the second phalanges of the fingers, each tendon splitting at its termination, to give passage to the similar tendons of the deep or perforating flexor muscle, which passes from the upper part of the ulma to be inserted into the last phalanx of each finger. This arrangement of the tendons of the superficial and deep flexor muscles is shown in fig. 4. To these flexor muscles



Fig. 4.

To show the perforation of one of the tendons of the superficial flexor muscle (which is inserted into the second phalanx), in order to allow the corresponding tendon of the deep flexor to pass onwards to be inserted in the last phalanx.

correspond the common extensor muscle of the fingers, which, like the flexors, divides into four tendons, one for each finger. Besides these, there is a special extensor of the index-finger, a series of muscles forming the ball of the thumb, which move that organ in almost every direction, and various small muscles giving lateral and other movements to the fingers.

It is sufficient to observe that the hand is very richly supplied with blood-vessels and nerves, without entering into any anatomical details on these points. There is no part of the body where the sense of touch is so acute as at the tips of the lingers; but we defer to the article Touch the consideration of the special arrangements which make this part of the hand peculiarly important in relation to our knewledge of external objects.

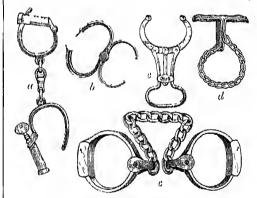
As a measuring standard for the height of horses a hand is a palm-breadth, assumed to be four inches. For left-handedness, &c., see RIGHT- AND LEFT-HANDEDNESS.

Our notice of the comparative anatomy of the Foot (q.v.) renders it nanceessary to trace the modifications presented in the lower animals by the bones corresponding to those of the human hand, as the carpal and metacarpal bones with their phalanges underge adaptations of form to meet the individual wants of the animal, very much in the same manner as the tarsal and metatarsal bones and their phalanges. Thus, the reader will readily see that the so-called knee of the horse, for example, is the carpus, and he will have no difficulty in tracing the motacarpal bones and phalanges. See Sir Charles Bell, The Hand, its Mechanism and Vital Endowments (Bridgewater Treatise, 1836; 9th ed. 1874).

Handcuffs, the instruments used for securing prisoners under arrest. In the 15th and 16th conturies they are spoken of as swivels, manacles, and shackbolts. Until within the latter half of

the 19th century, those in common use seem to have been only of two kinds—viz. the rigid or figure 8 handentls, employed chiefly in prisons for rising the standards, employed enterly in prisons for the punishment or restraint of refractory or violent prisoners, and the flexible or chain bandcuffs used by the police and military when conveying a person in custody from one place to another. With the former the wrists are so confined as to be fixed in one position either in front or behind the bady of the prisoner, the latter method being the one generally adopted when they are put on for intention of mison regulations. This punishment infraction of prison regulations. This punishment is a much dreaded one, the confinement of the wrists together at the prisoner's back even for a short period being exceedingly inksome and uncomfortable. The chain handent, which is in most common use, is made so that, while depriving the prisoner of the free use of bis hands and arms, a change in the position of these to some extent is required. is permitted, and the rigidity of the figure 8 handculls is avoided. Of recent years several improvements have been made in the construction of the handenlis. They are much lighter, and many of them are now adjustable (a in fig.). By means of a ratchet arrangement they are made to fit any size of wrist, and the difficulty which was formerly met by an officer taking two or three pairs of different sizes with him when going a distance to bring a prisoner has thus been overcome. For the removal of gangs of prisoners from one prison to another a long chain is used, running through and connecting the handculls by which each prisoner is secured. Gangs of eight or ten men are thus fastened together, the chain passing through a ring fixed on each handens, and made last at both ends by what are known as cullocks.

In addition to the handenffs above described there are several appliances, mostly of recent invention, which are employed by the police in securing prisoners, but which are not known among the officers of the law as handenffs. They



Various forms of Handouff's.

have a variety of names—such as snaps (b in fig.), nippers (c in fig.), toisters (d in fig.), &c. They are distinguished from the handcuffs by the fact that they are intended only for one wrist, the other part or handle being held by the officer conveying the prisoner. They are mostly of American origin, their chief design being to enable an offender to be instantaneously scenred, and thus prevent attempts to resist capture. The snap is the one most in use in Great Britain among detective officers; the smaller loop is slipped on the wrist of the offender, and the fastening is snapped into place and held in the hand of the detective; in an emorgency this instrument is very effective when used as a knuckleduster. In the United States and the colonies the nippers are recognised as the mest effectual for

prompt operation; by an ingenions arrangement of the centre-bar, shown in the lig., it can be instantaneously fastened by one hand on the wrist of an offender. The twister is now generally forbidden in Great Britain, instances having anisen in which its application has been attended with serious injury to the prisoner; but it is still frequently used in some parts of America and in other countries where open resistance to the law is of more frequent occurrence. It is composed of a chain attached to two handles. The chain is put round the wrist, the handles branght together and twisted till the chain grips tight enough. In cases where prisoners have to be removed who are charged with crimes of a desperate kind, the culprit is occasionally secured by leg-inons (e in fig.) in addition to the handlenffs, and these are also used in convict establishments upon prisoners who have shown themselves to be dangerous. The leg-iron is fastened above the ankle and locked by a key.

Handel, George Frederick, born at Halle, in Saxony, at No. 4 of the Gro-sei Schlamm, February 23, 1685. The German name was Georg Friedrich Handel (pronounced Hendel); but he himself signed G. F. Handel to the end of his life. His father (then sixty-three) was a surgeon; his mother the second wife. His passion and ability for music began from the first, but against his father's will. At seven or eight the boy was placed under Zachau, organist at Halle, and in about a year was writing a regular composition every week, besides playing organ, clavier, violin, and hautboy. In or about 1696 he was sent to the court of Berlin, where he met Ariosti and Buononeini the composers. In 1697 his father died, but his education was carefully continued, and on February 10, 1702, he entered the university of Halle, and in the same year became organist of the climich at the Moritzburg there. Before this time he was well known as a musician. In 1703 he went to Hamburg, then one of the most musical towns in Germany. Here he played second violin in the opera orchestra, accompanied on the theatre harpsichord, made all the music and enjoyed all the life possible. Among musical houses which he frequented was that of Sir Cyril Wich, English representative. In Holy week, 1704, he produced his first Passion. In December he had a duel with his friend Mattheson, nearly fatal, though the difference was soon adjusted; and on Jannary 1705, Almira, his first opera, was brought out, and was followed by Noro, Florindo, and Daphae—all in German. He also gave innumerable lessons, and wrote much harpsichord music. In the summer of 1706 he left Hamburg, and in Jannary 1707 we find him at Florence, in April at Rome, and in July back at Florence, producing Rodrigo. The first three months of 1708 he spent at Venice, and produced Agrippina; thence he went to Rome for another three months, and thence to Naples, possibly till Christmas 1709—the whole journey one continued triumphal progress, both in playing and composition. He then returned to Florence, a

composition. He then returned to Finience, and finished his visit at Venice in the middle of 1710. The returned by Halle to Hanover, and was made Kapellmeister, with an income of 1500 crowns, and leave to travel. Thence he went by Düsseldorf to London, where he arrived in November 1710. His first opera, Rinaddo, was produced at the Queen's Theatre, Haymarket, February 24, 1711, with prodigious success. After this he returned to Hanover, and remained in Germany till the antumn of 1712, when he went back to London. That winter he produced It Pastor Fido and Tesco. The spning of 1713 saw his first composition to English words, the first Birthday Ode, and the Utrecht Te Doum. During this time he lived chiefly with Lord Burlington at his house in Piccadilly. On August 1, 1714, Queen

Anne died, and on September 18 George I. arrived. The operas of this year were Silla and Amadigi. The king was naturally displeased at Handel's long absence from Hanover, and perhaps at his writing a Te Deum for Utrecht; link Handel made his peace by the Water Music, written for a royal water party, Angust 22, 1715. He received a pension of £200, to which were afterwards added two other amounts of £200 each, giving him a permanent income of £600, representing considerably more than the same sum at present. In July 1716 he accompanied the king to Hanover, and returned with him in the following Jannary. While there he wrote his second German Passion. In 1718–19 no operas were performed, and Handel was engaged by the Duke of Chandos to direct the music at his palace at Cannons, near Edgware. Here he wrote the twelve Chandos Anthems and two Te Derms (in B flat and A), Esther, Aris and Gulatea, and the first set of Lessons, containing the Harmonions Blacksmith.

In 1720 the Royal Academy was founded in the Haymarket, by subscription of £50,000, 'to secure a constant supply of operas by Handel, to be performed under his direction.' This was the beginning of the great revolution which for a bundred years and more kept English music, once so strong in its native school, under the dominion of foreigners. As director, Handel had been to Dresden early in 1719, and had engaged Senesino and others. Bach 1719, and lind engaged Senesino and others. Bach travelled thither to see him, but missed him by one day. The Royal Academy Theatre opened April 2, 1720, and Handel's Radamisto was produced. Thinteen other operas are spread over the next eight years—Muzio Secvola (Act 3 only composed by him), Floridante, Ottone, Flavio, Giulio Cosare, Tamerlano, Rodelindu, Scipione, Alessandro, Admeto, Riccardo, Siroe, Tolomeo. During this time he was naturalised, February 13, 1726. In June 1727 George II. succeeded to the throne, and as court George II. succeeded to the throne, and as court composer Handel composed Zudok the Priest, and three other anthems, for the coronation. On June 1, 1728, the theatre closed, and, the money being all spent, the Royal Academy of Music was at an end. Handel and Heidegger then took the house on their own account, and shortly after Handel set out to find singers in Italy. On June 29 he was at Halle with his mother, then suffering from paralytic than the house and till beauties 1.1500. sis, under which she lingered till December 21, 1100. The new venture opened December 2, 1729, with Lotario, followed by Partenope. The next season began November 3, 1730, and contained the new opera Poro; Ezio and Sosoome followed. This spring saw several revivals of Esther, also two of Acis and Galatea. The season of 1732–33 brought sis, under which she lingered till December 27, 1730. forward Orlando. The speculation, however, was not successful, the quarrels with the singers and rival composers were continual, and the result was the opening of the 'Opera of the Nobility,' to which the whole company had revolted, in Lincoln's Inn Fields, December 29, 1733. The struggle was tremendons. On one side was Handel with his partner; on the other a company of rich and powerful noblemen, with all the composers that could be got together—Buonouciui, Porpora, Hasse, and all the great singers. Handel's season began October 30, 1733, and he brought out Arianna. His contract for the King's Theatre expired July 6, 1734; then began a series of disasters and worries. The Nobility took the King's Theatre, and Handel was driven first to Lincoln's Inn, and then to Covent Garden, where, in partnership with Rich, he produced six new operas, Ariodante, Aleina, Atalanta, Giustino, Arminio, Berenice, besides reviving many of his old ones. On June 11, 1737, the Nobility retired, with a loss of £12,000, while Handel's losses had been so severe, including £10,000 of funded savings, that he was

542HANDEL

obliged to compound with his creditors, and give bills for a large amount. No wonder that the health of even his massive frame broke down; paralysis disabled his right arm, and his mind was for a time seriously disordered. A visit to Aix-la-Chapelle, and the strongest remedies there, however, restored him, and by November 7 he was back in London. This ended his career as composer-

manager.

Handel's opera days were now over. wrote a few more for his old partner Heidegger— Faramondo, Sorse, Imeneo, and Deidamia; but henceforward he was to tread a nobler path, that of the English oratorio, which has rendered him immortal. Esther had been composed before 1720, Deborah and Athatia in 1733, Alexander's Feast in 1736, in the very thick of his opera squabbles. Then 1736, in the very thick of his opera squabbles. Then camo the funoral anthem for his friend Queen Caroline, 'The ways of Zion' (1737), itself almest an oratorio, and containing some of his noblest music. Saul was produced early in 1739; Israal in Egypt followed in three months; then the Ode for St Cecilia's Day, November 1739, and L'Allegro, February 1740. The Messich, finished September 14, 1741, was produced in Dublin, April 13, 1742. He returned to London shortly after, and produced Samson (which he had begun before leaving for Dublin), as the leading work in an oratoric season Dublin), as the leading work in an oratoric season of twelve nights, in the course of which the Messuch was first given in London. The new style told, and he enjoyed a short time of prosperity. In 1743 he had a return of paralysis, and in 1751 we find him at Choltonham drinking its waters. But nothing interferes with his activity. From 1744 to 1750 oratorio follows oratorio, like lunge rocks thrown forth from a crater. The Dettingen Te Deum and an anthem, 'The King shall rejoice,' in commemoration of the great victory, were followed by Joseph, Semele, Belshazzar, Hercules, The Occasional Oratorio, Judas Maccabaus, Alexander Bulus, Joshua, Solomon, Susanna, and Theodora. Of these Judas, written as a hymn of triumph on of twelve nights, in the course of which the Messiah Of these Julias, written as a hymn of triamph on the campaign of Culladen, has always been the

most popular. Handel's music had now takon wider possession than ever of the public, and had penetrated to a lower stratum. At the Lenten 'Oratorios' nothing else was done. There, too, were his great organ else was done. There, too, were ms great organ performances, which were very popular. He was probably not a great pedalist, but the spirit and fire of his playing must have been immense. He has left eighteen organ concertes to testify to it. He composed for all occasions. The Anthem for the Peace and the Firavorks Music for the public states of the treaty of AN Left Chevelles were both fêtes after the treaty of Aix-la-Chapello were both his. The Foundling Hospital acquired much wealth through his music, and he himself made money, so that at his death he had the large sum of £20,000 in the funds. Of this £1000 was left to the Royal Seciety of Musicians.

In the summer of 1750 he went abroad, and arrive miscal Back, which like 1852.

again missed Bach, who died July 28. After his return he wrote Jophthath, his last oratorio. His cyes had for some time troubled him, and in May 1752 he was couched, but with no success. Henceforward, with some slight glinunering, he was virtually blind; but with the help of his ald pupil, John Christopher Smith, he continued his Lenton oratorio-concerts to the end. His last note was probably a pencil quaver, inserted in a quintet in Jephthah. He died in his house (now No. 25) in April 14, 1759, aged seventy-four, and was buried in Poet's Carner, Westminster Abbey, 8 r.M., April 20. At this time Haydn was twenty-seven, and Mozart three.

There is something expressly English in Handel's characteristics. His size, his hearty appointe, his

vast productiveness, his domineering temper, his humour, his power of business, are all our own. So was his eye to the main chance. When a friend picked out the best pieces in one of his oratorios, pieked out the best pieces in one of his oratorios, he said, 'True, they are the best; but you have forgotten the pieces that are to make the money.' In fact he pre-eminently belongs to England. The practical sense of his music, and its close alliance with the Bible, joined to its lofty imaginativeness, it the English music. It is compared observator and with the Bible, joined to its lofty imaginativeness, suit the English public. Its sacred character and its independence of the theatre also fall in with our Puritan spirit. Abroad he is little known, and that mostly as a curiosity. But to the great English public he is even still their meat and drink. And yet on how slender a thread does the connection hang! But for the oratorios of the Messiah and Israel in Egypt Handel's name could hardly have been what it is to us. His operas scarcely lasted beyond their original production. When thintio Cestere was revived in 1787 (the year in which Don Giovanni was brought out in Vienna), it had to be curicled by the most favourite songs from the others, to make it go down. The Messuch, however, took the English people from the first, and has gone on being performed more and more till now. It must have been heard and more till now. It must have been heard oftener than any play of Shakespeare's. The revival of Israel fellowed in our own times, though its fame is still incomplete. It is no exaggeration to say that these two works have made Handel's name immortal. In them he fortunately forgot that the house had to be filled; nothing is ad captandum—all is pure music. But for the light reflected from them few of his works would have remained to the present day. The bright light cast from these two masterpieces illumines a number of compositions which otherwise would have forever remained in the dark. More than this, there can be no doubt that the enormous spread of music since his day has been very largely due to the popularity of the Messiah. Cheap editions of that noble work have always led the van.

It is unnecessary to describe the characteristics of his compositions, because every Briton knows them, or can know them. His plagiarism must be mentioned, though there is no room to deal with both sides of the subject. His habit of using—almost of proferring—ideas from strongers or from his own earlier works is most remarkable. Perhaps this was his own practical way; the work had to be done in the time, and he trusted in himself that all would be right. Perhaps, too, the habit came from a deeper source than mere economy. When from a deeper source than more economy. When writing the Hallelnjah Chorns, he looked up like the Hangle, and had the sume vision. 'I did see,' said he, 'all heaven open before me, and the Great God Himself.' This was the spirit in which he composed; and to one so near the fount of inspiration themes or passages will always be subordinate to the general result, which in Handel's case is pure gold. Sometimes he takes movements bodily ('Egypt was glad'), but he oftener adopts fragments or subjects. His power of transformation is extraordinary. He will take an ordinary theme from some trivial work, and transmute it into an absolutely immortal mamment ('Hailstone chorus'). On the other hand his very greatost works are absolutely his own ('Hallelnjah;' 'The people shall hear,' &c.). And the remarkable thing is that with all this business-like procedure the effect is so high, characteristic, and appropriate Rectivery's indepent on him and appropriate. Beetheven's judgment on him was perfectly sound: 'Handel is the unapproachallo master of all masters; go to him and learn to produce great effects with little means.'

Handel's powers of work were enormous. He rarely sketched his pieces, but began the score

at once. Scoring was a light matter in those days, but even so he was very rapid. *Rinaldo* was written in fourteen days, *Tamerlano* in twenty, the *Messiah* in twenty-four, and *Israel* in fifteen.

This face was far nobler than is usually supposed. The portraits are mostly poor, and the gross features they give are part of the inveterate caricature which pursued his figure, his features, and his language through life. Those who want to see him as he was should have a east of Roubiliac's head in Westminster Abbey, itself taken from a mould, and full of tenderness and dignity. His smile is said by those who had seen it to have been heavenly, 'like the sun breaking through a cloud.' For English biographics read his Memoirs by Mainwaring (1770), and his Life by Rockstro (1883), with a complete list of works and dates. Chrysander's German biography is invaluable, but unfinished (vols. i.-iii. 1856-67). Of the works themselves the best edition is that of Chrysander (1856 et seg.); with all possible condensation they fill ninety-eight vols. The majority of the autograph MSS, are at Buckingham Palace; sketches are at Cambridge in the Fitzwilliam.

The first Handel Commemoration performance was held in Westminster Abbey in 1784; Handel Festivals have been held since 1859, usually triennially, at the Crystal Palace. Handel societies for the publication of Handel's works were founded in London in 1843, and Leipzig in 1856, and a Handel and Haydn Society for performances of their works at Boston, U.S., in 1815.

Handfasting (in Old English, merely 'betrothal;' A.S. handfæstan, 'to pledge one's hand') was a custom at one time prevalent in Scotland, by which a man and a woman entered into conjugal relations on the strength simply of a verbal contract of marriage. Persons so handfasted were bound to each other for a twolvemonth and a day, after which they could either separate or be formally united in marriage. The custom had its great evils in society, and the clergy, both of the pre-Reformation and the post-Keformation churches, directed many injunctions against it. See MORGANATIC MARHAGE.

Handicapping is the term used in various games and sports to denote the placing of competitors, good, bad, and indifferent, on such a footing that all shall have, as nearly as possible, an equal chance of winning. Thus, in Horse-racing (q.v.), when the speed of one horse has been ascertained to be greatly superior to that of another, the swifter of the two, in a handicup race, is made to carry extra weight to an amount that shall be deemed sufficient to reduce its speed to a level with that of its antagonist. In pigeon-shooting from traps, the more skilful the shooter, the farther back has he to stand from the traps. In games such as chess and draughts, certain 'men' are allowed to the inferior player; in billiards, the better of two allows his antagonist a certain number of 'points;' at cricket, an eleven, such as the eleven of All England, will sometimes play against twenty-two others, the competition being at times very close. In swimming and in pedestrianism, the inferior competitors are allowed a certain 'law,' or start; in yachting, the vessel of greater tomage is handicapped with lesser ones by allowing them extra time for the performance of the race.

Handsel denotes earnest-money, or part-payment, by way of binding a bargain. In some parts of England 'fasten-penny' is used with the same signification. In Scotland handsel popularly signifies the first of a series of transactions in trade, as, for example, the first sale effected in the day or week, or the first of a series of presents. It is likewise employed to signify a present given, generally to a servant or child, on the first Monday in the year—hence called Handsel Monday.

Hand-tree (Cheirostemon platanoides), a large tree of the natural order Sterculiaceæ, which receives its name from the peculiar appearance of its flowers. These have no eorolla, but a large 5-lobed, angular, coloured ealyx—bright red within—from which project the five stamens, united by their filaments into a column, and separating and curving at the summit, where they bear the anthers, so as to have some resemblance to a hand or claw. It is interesting also as being an object of superstitious veneration to the Mexicans, and as being related to the famous Baobab or Monkey-bread (Adansonia digitata) of Senegal, Guinea, and other countries of that region of the west coast of Africa.

Handwriting. See WRITING, EVIDENCE, EXPERT.

Hang-chow (Hang-chau), the gate of the great imperial canal, and capital of the province of Cheh-chiang, in China, is situated on the left hank of the Tsien-tang, where that river disembogues into the Bay of Hang-chow, about 110 miles SW. of Shanghai. It was the capital of the Sung empire of southern China previous to its overthrow by the Mongols, and was a splendid city when visited by Marco Polo early in the 14th century. The city, one of the great commercial, religious, and literary centres of China, has clean, well-paved streets and many magnificent temples, is a principal seat of the silk manufacture, of gold and silver work, and is noted for the beauty of its surroundings. From a remote period, many spots in the environs have been the resort of pilgrims; and here several thousands of candidates assemble every year for the public examinations. It was formerly a naval port. The river is subject to a dangerous bore or cagre. Previous to the Taiping rebellion, the city had some 2,000,000 inhabitants; but it was then (1861) laid in rmins by the rebels, and now contains a population estimated at from 400,000 to 800,000.

Hanging. See EXECUTION, STRANGULATION. Hanging Gardens. The Hanging Gardens of Babylon were anciently reekoned among the wonders of the world. Their construction is variously ascribed to Queen Semiramis and to Nehnchadnezzar. Diodorus and Strabo have given descriptions of them. They are said to have formed a square, with an area of nearly four acres, and rose in terraces, supported on masomy arches, to a height of 75 feet. They were inigated from a reservoir built at the top, to which water was lifted from the Euphrates by a screw. Fountains and bauqueting-rooms were distributed throughout the numerous terraces; groves and avenues of trees, as well as parterres of flowers, diversified the scene; whilst the view of the city and neighbourhood was extensive and magnificent.

Hang-nests (Icterialw), a family of fineh-like perching birds peculiar to America, and widoly distributed over both continents, though most largely represented in the tropical parts of South America. They are often known as American Orioles, a name received because of their brilliant black and yellow colour, not from any connection with the orioles of the Old World. The family includes many well-known birds, such as bobolinks, cow-birds, grackles, &c., but the name hang-nest is not literally applicable to all, and most perfectly to such genera as Cassicus and Ostinops from tropical South America. The eurious purse-like nests woven by many of these birds are often about two feet in length, and have a hole for entrance near the bottom, at one side. One of the best-known species of hang-nest is the Baltimore Oriole (q.v.). The hang-nests are related to the starlings and Weaver-birds (q.v.) of the eastern hemisphere.

Han-hai, an ancient dried-up sea in central Asia, now represented only by Lake Lob-nor (q.v.). See Asia, Vol. I. p. 486.

Hankow (Han-k'an), a river-port of China, in the province of Hu-pei, at the junction of the Han River with the Yang-t-ze, 600 miles W. of Shanghai. Strictly speaking, Hankow is a suburb of the towns of Wu-chang and Hau-yang, the three together forming one huge city. Vessels of large size can reach Hankow, the river being navigable to the city of Ichang, 420 miles higher up. Since 1862 Hankow has been open to forcign trade. The principal article of export is tea, of which one-fourth to one-third out of a total of 115 to 120 millions exported annually are sent to London. Other articles of export are silk, oil, vegetable tallow, tobacco, hides, nutgalls, coal, mu-sk, and wax. The chief imports are opinm, cotton, piecegoods, woollens, metals, sugar, edible scaweed, sapanwood, 'llama' braid, dyes, matches, kerosene oil, and needles. For the three years ending 1887 the average annual imports were valued at £6,250,000, and the exports at £5,300,000. These figures are exclusive of £1,144,500 at nucoined silver imported, and £365,200 exported. Of its large trade with the provinces of the interior no statistics are published. In 1889 a decree of the emperor authorised the construction of a railway from Hankow to Peking, 700 miles in length. Before the Taiping rebellion the three cities had a population of over 5,000,000; it is now about 1,700,000, Hankow having 750,000 of these.

Hanley, a town of modern growth, in Staffordshire, in the district known as the Potteries (q.v.), 18 miles N. of Stafford. It mannfactures china, carthenware, and encaustic tiles. In the vicinity are coal and iron unines. Hanley was constituted a municipal horough in 1857, and a parliamentary borough, returning one member, in 1885. Pop. (1851) 25,360; (1871) 39,970; (1881) 48,361; of parliamentary borough (including Burslem, q.v.), 75,912.

Hanna, William, the biographer of Chalmers, was born in 1808, the son of a theological professor at Belfast. He was educated at the university of Edinburgh, and was ordained in 1835 to the Lauarkshire parish of East Kilbride. He came out at the Disruption, and became in 1850 colleague to Dr Guthnie in Free St dolm's Church, Edinburgh. He was made D.D. by Edinburgh in 1864, and resigned his elurch through ill-health in 1867, but survived until 1882. He edited for some years the North British Review, and published many theological books, of which perhaps the best known is Our Lord's Life on Earth (1869). Well-known works are his Memoirs of Dr Chalmers, his father-in-law (4 vols. 1849-52; a fifth, his correspondence, 1853), and The Letters of Thomas Erskine of Linlathon (1877-78).

Hannay, James, critic and novelist, was born at Dumfries, 17th February 1827. A few years of boyhood were spent in the navy, from which he was dismissed at eighteen by a court-martial sontence, afterwards quashed as irregular. He early devoted himself to a busy life of letters, finding a favornite pastime in the study of genealogy, heraldry, the classics, and 18th-century English literature. For some years he edited the Edinburgh Concrant, and was afterwards British consul at Barcelona, where he died suddenly, 3d January 1873. Of his novels the best are Singleton Fontonoy (1850) and Eustace Conyers (1851). His Lectures on Satire and Satirists (1854) and Essays from the Quarterly Review (1861) show wide knowledge and fine literary sense, often expressed in admirably terse and epigrammatic English. Other works were Three Hundred Years of a Norman Honse—the Gurney family (1866), and Studies on Thackeray (1869).

Hannibal, a city of Missouri, on the Mississippi, here crossed by an iron railroad bridge, 111 miles by rail NNW. of St Louis. The centre of an important network of railways, it has an extensive trade in hunber, flour, and cattle, and manufactories of flour, tobacco, lime, and railroad cars. There are coal-mines close by. Hannibal is the seat of a Methodist college. Pop. (1880) 11,074.

Hannibal ('the grace of Baal;' cf. the Hanniel of Scriptane) was the son of the great Carthaginian general Hamilean Barea (q.v.), and was born in 247 B.C. It is said that in his ninth year his father led him to an altar and bade him swear eternal enmity to Rome. From the age of nine to eighteen he was trained in war and diplomacy under Hamil-car in Spain; and from his eightcenth to his twentylifth year he was the chief agent in carrying out the plans by which his brother-in-law, Hasdrubal, extended and consolidated the Carthaginian dominion in the Peninsula. On the death of Hasdinbal in 221 B.C., the soldiers with one voice chose Hamilton, then in his twenty-sixth year, as their general. Forthwith he crossed the Tagus, and in two years reduced all Spain up to the Ebro, with the excepwhich elaimed the protection of Rome, fell in 218 B.C., and the Second Punic war, or as the Roman justly called it, 'the War of Humibal,' began. Garrisoning Libya with Spaniards, and Spain with Libyans (a precaution against treachery), Hannibal set out on his march for Rome. In the summer of set out on his match for Rome. In the simmler of 218 B.C. he left New Carthage with 90,000 foot, 12,000 horse, and 37 elephants, crossed the Pyrenees, and gained the Rhone, where his passage was barred by a host of Gauls. The general thereupon sent part of his troops two days' journey up-stream, with orders to cross the Rhone and fall on the rear of the barbarians. His orders were executed by Hanno, and the passage of the river was safely effected. He crossed the Alps in lifteen days, in the face of obstacles which would have proved insuperable to almost any other commander. His troops, reared under African and Spanish suns, perished in thousands amid ice and snow. The native tribes threatened the annihilation of his force, and were only dispersed by his matchless comage and address. The beasts of burden fell over precipiees or stack fast and were frazen to death. In places, rocks had to be shattered and roads constructed to enable the men to ereep round projecting crass. When he gained the valley of Aosta, Hannibal had but 20,000 foot and 6000 horse to attempt the conquest of a power which had lately shown that she could put an army of 170,000 unrivalled soldiers into the field. After allowing his men to recruit in the villages of the friendly Insubres, he overcame the Taurini, besieging and taking Tuvin, and forced the Ligurian and Celtic tribes on the Upper Po to serve in his army. At the Ticimus, a stream which enters the Po near Pavia, he encountered the Romans under Scipio. The cavulry of both armies joined battle, Hamibal's Numidian horse proved their superiority, and Scipio fell back beyond the Po. The Carthaginians crossed the river, and the first great battle of the campaign was fought in the plain of the Trebia. Placing Mago in ambush with 2000 men, Hamibal entired the Romans across the stream. His light troops retired before the legionaries, and as Scipio was pressing on to faucied victory he was taken in flank by the terrible Numidian horse, Mago came down in the rear, and the 40,000 men of the consular army were either ent to pieces or scattered in flight. Wintering in the valley of the Po, in the early spring Hannibal crossed the Apennines and pushed through a region of lakes, flooded by the melting of the snows, to Fassilar. The heasts of burden perished in vast numbers amid the morasses; the Gauls, disheartened by

the perils of the journey, had to be driven forward by Mago's horsemen, and the general lost an eye. Quitting Fasalle, Hannibal wasted Etniria with fire and sword, and marched towards Rome, leaving behind him two consular armies of 60,000 men. He awaited the consul Flaminius by the Lake Trashmene, where the hills, retning in a semicircle from the shore, enclose a plain entered by two narrow passes. Concealing the main body of his army amid the hills, he placed his Numidians in ambush at the pass by which the Romans must enter; while he stationed part of his infantry in a conspicuous position near the other defile. The Romans pushed into the valley; the pass in their tear was secuted by the Catthaginians who had lain in ambush; Hannibal's men charged from the heights, and the army of Flaminins was annihilated. Six thousand infantry ent their way through the farther pass, but these were overtaken by the house under Maherbal and forced to yield on the following day.

After recuiting his men in the champaign country of Picenum, where the Numidian hotses, we are told, were groomed with old Italian wine, Hannibal marched through Apulia and ravaged Campania, dogged by the dictator Quintus Fabins Maximus, whom he vainly endeavoured to cutiee into an engagement. He wintered at Gerontium, and in the spring took up a position at Canne on the Aufidus. A Roman army of 80,000 men, under the consuls L. Emilius Paulus and P. Terenting Varro, marched against him. Hannihal flung his troops (he had but 30,000) into a space enclosed on the rear and wings by a loop of the river. He placed his Spanish infantry in the centre, with the African foot on either flank. His Numidian horse, now reduced to 2000 men, he posted on the right wing; while Hasdrubal, with 8000 heavy cavalry, was apposed to the Roman cavalry on the left. The legionaries pressed into the loop, and Hannibal drew back his centre before them. Hasdrubal on the left wing of the Romans, drove the second detachment of Roman horse into flight, and then came thundering in the rear of the legionaries. The Libyans, who had by the general's orders fallen back as the Romans pressed after the rething Spanish infantry, now closed on the enemy's flanks. Packed together so closely that they could not use their weapons, assailed in front, flank, and rear, the legionaries were hewn down through eight hours of carnage till 50,000 lay dead on the field. The battle became a butchery. Nearly 20,000 men were taken prisoners. The consul Paulus, the proconsul Servilius, the master of the horse Minucus, 21 military tribunes, and 60 senators lay amid the slain. On his side Hannibal lost but 5700 men. Send me on with the house, general, said Maherbal, 'and in five days thou shalt sup in the Capitol.' But the general was wiser than the fiery eartain

But the general was wiser than the fiery captain of the horse. It has been common to censure Hannibal for neglecting to march on Rome after the battle of Cannac. But his dazzling trimuph did not for a moment unsettle his clear judgment. He knew that his forces were unequal to the task of storning a walled city garrisoned by a population of fighting men. An attack which he had made on Spoletium had proved the inadequacy of the small Carthaginian anny to carry a strongly fortified town. Had he followed the advice of Maherbal, he would, in all likelihood, have dashed his army to pieces against the walls of Rome. His aim was to destroy the common oppressor by raising the Italian allies against her; and the hope was partly justified by the revolt of Lucania and Bruttium, Samniam and Apulia. The soundness of judgment, the patience and self-control which he evinced in this hour of intoxicating success are hardly less mar-

vellons than the genins by which the success had been won. After the battle of Cannæ the character of the war changes. Hitherto Hannibal had swept everything before him. Rivers and mountains and morasses had been powerless to thwart his progress. Army after army, vastly superior in numbers and composed of the best lighting men the ancient world ever saw, had come against him to be broken, scattered, and destroyed. His career through Italy had been, in the words of Horace, as the rush of the flames through a forest of pines. But after Cannæ the tide turned. His niggardly, short-sighted countrymen denied him the support without which success was impossible. As his veterans were lost to him he had no means of filling their places, while the Romans could put army after army into the field. But through the long years during which he maintained a hopeless stringgle in Italy he was never defeated. Nor did one of his veterans desert him; never was there a minumer of disaffection in his camp. It has been well said that his victories over his motley followers were hardly less wonderful than his victories over nature and over Rome.

than his victories over nature and over Rome.

Hamibal spent the winter of 216-215 B.C. at
Capua, where his men are said to have been
demoralised by luxurious living. When he again
took the field the Romans wisely avoided a pitched
battle, though the Carthaginians overran Italy,
capturing Locri, Thurit, Metapontum, Tarentum,
and other towns. In 211 B.C. he marched on
Rome, rode up to the Colline gate, and, it is
said, flung his spear over the walls. But the fall
of Capua smote the Italian allies with dismay,
and ruined his hopes of recruiting his everdiminishing forces from their ranks. In 210
B.C. he overcame the pretor Fulvius at Herdonea,
and in the following year gained two battles
in Apulia. Thereafter, he fell upon the consuls
Crispinus and Marcellus, both of whom were
slain and their forces routed, while he almost
annihilated the Roman army which was besieging
Locri. In 207 B.C. his brother Hasdinbal marched
from Spain to his aid, but was surprised, defeated,
and slain at the Metanrus by the consul Nero.
By the harbarous commands of Nero, Hasdrubal's
head was flung into the camp of Hannibal, who
had been till then in ignorance of his brother's
doom. The battle of the Metanrus sealed the
fate of 'the lion's brood'—of the great house of
Hamilear. But for four years Hannibal stood at
bay in the hill-country of Bruttium, defying with
his thinned army every general who was sent
against him, till in 202 B.C., after an absence of
fifteen years, he was recalled to Africa to repel
the Roman invasion. In the same year he met
Scipio at Zama; his raw levies fled, and in part
went over to the enemy; his veterans were cut
to pieces where they stood, and Carthage was at
the mercy of Rome. So ended the Second Punic
war—the war, as Annold so truly said, of a man
with a nation, and the war which is perhaps the
most wonderful in all history. Three lundred
thousand Italians had fallen, and three lundred
towns had been destroyed in the struggle.

war—the war, as Annold so truly said, of a man with a nation, and the war which is perhaps the most wonderful in all history. Three hundred thousand Italians had fallen, and three hundred thousand Italians had fallen, and three hundred towns had been destroyed in the struggle.

Peace being made, Hannibal turned his genius to political toils. He annonded the constitution, cut down the power of the ignoble oligarchy, checked corruption, and placed the city's finances on a sounder footing. The enemies whom he made by his reforms demonned him to the Romans, and the Romans demanded that he should be surrendered into their hands. Setting out as a voluntary exile, Hannibal visited Tyre, the mother-city of Carthage, and then betook himself to the court of Antiochus at Ephesus. He was well received by the king, who nevertheless rejected his advice to carry the war with Rome into Italy. On the conclusion of peace, to avoid being given up to the

243

Romans, he repaired to Prusias, king of Bithynia, for whom he gained a naval victory over the king of Perganus. The Romans again demanding that he should be surrendered, he haffled his enemies by taking poison, which, we are told, he carried about with him in a ring, and died at Libyssa about the

year 183 B.C.

In judging of the character and achievements of Hannibal, it must never be forgotten that for all that we know of him we are indebted to his implacable enemies. No Carthaginian record of that astounding career has come down to us. The Romans did all that nuscrupulous malignity can to blacken the fame and belittle the deeds of the most terrible of their foes. Yet, though ealumny has done its bitterest against him, Hannibal not only dazzles the imagination but takes captive the heart. He stands out as the incarnation of magnanimity and patriotism and self-sacrificing heroism, no less than of incomparable military genius. Napoleon, the only general who could plausibly challenge the Carthaginian's supremacy, had throughout the greater part of his eareer an immense superiority to his adversaries in the quality of the forces which he wielded. He had the cutinusiasm of the Revolution behind him, and he was unhampered by authorities at home. Hannibal, on the contrary, saw his plans thwarted and finally wrecked by the sordid merchant-nobles of the city he strove so hard to save. He had not, like Alexander, to lead picked troops against effenime Asiatics. He had to mould his little army out of raw and barbarous levies. He had no reinforcements to fall back on. With a motley army of Libyans, Gauls, and Spaniards he had to encounter a nation in arms—a nation of the stoutest and most highly-trained warriors of ancient an example of what a single man of genius may achieve against the most tremendous odds as the story of the Phonician hero—the greatest captain that the world has seen. See Bosworth Smith's Carthage and the Carthaginians (1879); Hennebert's Viv d'Hannbal (1870-78); and the other works referred to in the article CARTHAGE.

Hannington, James, first Bishop of Eastern Equatorial Africa, born 3d September 1847, at Hurstpierpoint in Sussex, became a student of St Mary Hall, Oxford, in 1868, and was ordnined in 1873. In 1882, after seven years' earnest labour in his native parish, he volunteered for missionary work in Africa, and was sent out by the Church Work in Africa, and was sent out by the Chirch Missionary Society to reinforce their missionaries in Uganda. But his health broke down when he reached Kagei, on the south shore of Victoria Nyanza, and he was obliged to return home to England. His health improving, he was, on 24th June 1884, consecrated Bishop of Eastern Equatorial Main Children and Child June 1884, consecrated Bishop of Eastern Equatorial Africa, and in the following January entered his new diocese, taking up his quarters at Frere Town, near Mombasa. In July 1885 he started once again for the interior, the object of his journey being to reach the mission-station of Rubaga, in Uganda. But, after successfully surmounting the difficulties and dangers of the road through the land of the Masai, he was slain by order of Mwanga, king of Uganda, on 29th October 1885, at a place not far from the right bank of the Nile. See his Life by Dawson (1887) and his Last Journals (edited in 1888). Journals (edited in 1888).

Hanno, a name borne by a number of Carthaginian admirals and soldiers, one of whom was defeated by the Romans in the sea-fight of Ecnomy in 250 B.C. Another Hanno, surmaned the Great, was the leader of the peace party who opposed the patriotic party headed by Hamilear Baren, during the interval between the First and

the Second Punic war. When the Carthaginian mercenaries revolted in 241 n.c. Hanno was appointed to reduce them to submission. He proved a thoroughly incapable general, and the task in which he had failed was discharged by Hamilear Barca.

Hanno, a king or magistrate of Carthage who undertook a celebrated voyage of discovery along the west coast of Africa. His expedition is said to have consisted of sixty slups; he founded namer. ons colonies or trading-stations, and proceeded as far south as a point that has been variously identified with places between Cape Nun and the Bight of Benin. On his return to Carthage be inscribed an account of his voyage on a tablet, and placed it in the temple of Moloch. It seems to have been written in the Punic language; the version of it which remains, cutitled the Periplus of Hanno, is only a Greek translation. The date of the voyage has been assigned to different periods between 570 B.C. and 470 B.C., and the identification of the anthor of it has been also a subject for dispute. For a full discussion coupult Dodwell's Dissertations, prefixed to Hudson's Geog. Vet. Scriptores (1698); Bougainville's, Vivien de St Martin's, and Tauxier's Essays, Falconer's English translation (1797), and Mer's Mémoire sur le Périple d'Hannon (1885).

Ha-noi, the capital of Tong-king, and bead-quarters of the French administration, on the left bank of the Song-coi or Red River, 80 miles in a direct line from the sea. The commercial city has a river-front of a mile and a half; the citadel behind contains within its walls most of the official huildings. Embroidery and work in mother of-pearl are the chief local industries. Pop. 100,000.

Hanover (Ger. Hanno'ver), formerly a kingdom of northern Germany, but since 1866 incorporated with Prussia. Area of the Prussian province, 14,833 with Prussia. Area of the Prussian province, 14,833 sq. m., or nearly twice the size of Wales; pop. (1871) 1,963,080; (1885) 2,172,702, of whom 1,441,695 were Luthernus, 266,134 Catholies, and 15,009 Jews. Except in the south, where the Harz Mountains (q.v.) attain a maximum altitude in Hunover of 3037 feet, the surface belongs to the great north German plain, and is diversified by moors and heaths, notably the extensive Lünehurg Heath. It is watered by the Elbe, Weser, Ems, and their tributaries. The people carry on mining in the Harz, entile breeding on the marshes and in the Harz, cattle breeding on the marshes and heaths, agriculture in the more fertile regions, and senfuring pursuits on the coast. The weaving of linen, cloth, and cotton, the working of iron and other metals, glass, paper, and pottery making, and bleaching, count amongst the more important industries. The mining products are very various, and include iron, silver, zinc, lead, copper, coal, salt, petrolenm, and tarf. Bees are kept in the Limelung Heath; Norderney and Borkum (islands) are much frequented as seaside resorts. Gottingen is the seat of a university, and the capital is Hanover (q.v.). See also Prussia, Germany. The people of the north-eastern and central pro-

vinces are mostly Saxons; those on the coast are of Frisian origin; those on the west of the Eus, Dutch; and those in the southern provinces, Thuringinus and Franconians. Platt-Deutsch, or Low German, is commonly spoken in the rural districts; but High German is the language of the educated and higher classes, and is spoken with more purity than in any other part of the empire.

History.—Hanover was occupied in remote ages by Saxon tribes, who, after an obstinate resistance, submitted to Charlemagne and embraced Christianity. In the time of Louis the German it was incorporated in the duchy of Saxony. In 951 the Emperor Otho I. bostowed it on Hermann Billing; on the extinction of his family in 1106 it fell to Lothaire of Supplinburg. By the marriage of his daughter to Henry the Proud of Bavaria, the duchy passed to the Guelphs. Henry the Lion, son of Henry the Proud, did much to advance the civilisation of his subjects by conferring rights and privi-leges upon various towns which had advocated his cause; but, when he fell under the ban of the empire, a period of anarchy and confusion succeeded, which at list threatened the ruin of the country. When, however, in 1180 Henry was deprived of the duely of Saxony, he was allowed to retain his hereditary lands of Brinswick and Lüneburg. From this time down to the 16th century the history of Hanover is inseparable from that of Brunswick (q.v.).

The history of Hanover as a modern state begins with the foundation of the line of Brunswick-Lineburg by William, who, in the partition which he and his elder brother Henry (the founder of the reigning Brunswick house) made of the dominions of their father, Ernest I., obtained in 1569 the duchtes of Lüneburg and Celle (Zell). William died in 1592, leaving seven sons, of whom four snecessively ruled over the land. Of the seven only one (George) married. His eldest son, Christian Lewis, in accordance with a family compact, took (1648) as his portion of the inheritance Lüneburg, Grabenhagen, Dienlolz, and Hoya, with Celle for his residence; while his next brother, George William, obtained Kalenberg and Güttingen, with Hanover for his residence. Thus originated the lines of Celle and Hanover. Christian Lewis set himself the task of raising his country from the miseries it had endured in the Thirty Years' War. After his death in 1665 his brother George William exchanged his own duchy for that of Celle, leaving Hanover to a younger brother, John Frederick. George William, as Duke of Celle, deserves notice for his warlike and active administration: he sent auxiliaries to Venice to aid the republic against the Turks; co-operated with the Duke of Brunswick to reduce his insurgent eapital; entered into an alliance with the emperor against France and Sweden; sent an army into Hungary to resist the Turks; and in 1688 lent troops and money to William of Orange against James II. of England. John Frederick of Hanover entertained a great admiration for the French, and aped the magnificence of the court of Versailles. He was succeeded by his brother, Ernest Angustus (another son of George), in 1679. Thus the Hanoverian tetritories were again united under one head, in George Lewis, son of Ernest Augustus, who succeeded to the duchy of Hanover in 1698, and to that of Celle in 1705. The mother of George Lewis was Sophia, daughter of Frederick V. of the Palatinate and of Elizabeth, daughter of James I. of England. In 1714 George Lewis became king of England as George I. His father, Ernest Augustus, had in 1692 been invested with the dignity of the newly-created minth electorate.

Under George Lewis as king of England and second elector of Hanover or Brunswick-Lüneburg, a brighter epoch opened to the Hanoverians; they were relieved from the burden of maintaining the ducal court and household, and the revenues of the erown were thenceforth appropriated to the general purposes of the state. The government was left in the hands of a viceroy and the confidential conneil. Bremen and Verden were obtained in this reign by purchase from Sweden (1719). George II., who succeeded in 1727, like his father spared the revenues of Hanover at the expense of those of England. In his character of elector, he esponsed the cause of Maria Theresa in the Austrian war of succession; but in the Seven Years' War Hanover sided with Prussia against Austria and France, and suffered severely, especially by the capitulation of Closter-Seven (1757). This king founded the This king founded the

The peace university of Gottingen in 1734-37. which prevailed during the first thirty years of the reign of George III., who succeeded on the death of his grandfather in 1760, and who alone of the four Georges never visited his German dominions, proved a veritable godsend to Hanover, which also profited by the increased English and American trade. In 1793 Hanovenian troops took part in the wars against the French Republic, the expenses of their maintenance being defrayed by England. But in 1801 Prussia, refusing to acknowledge the nentrality of Hanover, threw troops into the electorate, and maintained her military occupancy for a year. In 1803, when war was renewed between England and France, an anny under Mortier intimidated the Hanoverians to such an extent that, without striking a blow, they pledged themselves to abstain from serving against France, to disband their army, to give up their arms and horses to the enemy, and to submit to receive Freuch comps of occupation 30,000 strong. In 1807 Napoleon appropriated a portion of the electorate to complete the newly-formed kingdom of Westphalia, which in 1810 received the whole of the Hanoverian territory. On the successful termination of the war of liberation, Hanover was ereated a kingdom in 1815. In 1819 a new constitution was granted, which made provision for the election of two representative chambers; but it only lasted until 1833. Nevertheless, the general disaffection and distrust had used to the highest pitch when William IV. ascended the throne; and in 1831 the prime minister, Count Münster, who had long been obnoxions to the mass of the people, was dismissed, and the Duke of Cambridge, son of George III., who had since 1816 aeted as governor-general, was invested with the title of viceroy. George IV. was of comes also king of Hamover; but on the death of William IV. in 1837 Hamover was separated from England and given to the next male heir, Ernest Angustus, Duke of Cumberland, the fifth son of George III. (1771-1851). This prince initiated a policy in all respects reactionary; but in 1848 he did so far yield to the storm as to just save his throne by the un-willing concession of liberal reforms. A famous incident in the struggle was the protest and expulincident in the struggle was the protest and expulsion in 1837 of seven Göttingen professors (see Göttingen). His son, the blind George V. (1819-78), who succeeded in 1851, held very extreme views in regard to the kingly power and the claims of the aristocracy, and for fifteen years he struggled against the will of the people in defence of his absolutist ideas. In the quarrel between Austria and Prussia in 1866 Hanover took part with the former, and at Langensalza (27th June) sustained a severe defeat. Consequently it was first occupied by Prussia, and finally annexed. George V. until his death, and since then his son, Ernest Angustus, Dake of Cumberland (b. 1845), still maintaining their claim to the Hanoverian throne, were compelled to live in banishment. The incorporation with Prussia was viewed with anything but general with Prussia was viewed with anything but general favour; Professor Ewald, for instance, to the day of his death, being a staunch adherent of the exiled house. In 1868 the so-called Welfenfonds ('Guelph-finnd')—the private property of the king of Hanover—was sequestrated by Prussia, and has subsequently been managed by a commission. Prince Bismarek's enemies are wont to affirm that this fund—called by them Reptilienfonds ('Reptile-fund')—is largely used for bribing newspapers to support the government policy.

See Gemeinde-textkon für die Provinz Hannover (Berl. 1887); and works by J. Meyer (1886), Grotefend (1857), and Meding (1881-84).

Hanover (Ger. Hannover), formerly capital of the kingdom, now chief town of the province of Hanover, is situated on a sub-tributary of the Weser, 78 miles SE. of Bremen, 112 S. of Hamburg, and 158 W. of Berlin. It consists of the old town, with narrow streets and medieval houses, and the handsome modern town, lying north, east, and south-east of the older portion. The most interesting buildings are the town-hall, founded in 1439, with antique sculpture and fine freezoes; the engal library, with 170,000 volumes and 4000 MSS, incumbula, archives, and valuable state papers; the theatre, one of the largest and dramatically one of the most important in Germany; the palace of King Ernest Augustus, with a library and collections of coins, arms, and engravings; the unsemm, with good natural history and art collections; the royal state palace; the Kestner Museum, with Et uscan, Greek, and Roman antiquities and a collection of engravings (120,000); the polytechnic school, formerly a ducal castle; the castle church, in which are preserved a collection of medieval church utensils, relies, many of them brought from Palestine by Henry the Lion in 1172, and an alturice by L. Cranach; the 14th-century 'market' church, with stained glass and monuments; and the 'new town' church, with an elegant tower and the touch of Leibnitz, who died in Hamover. The magnificent railway station, perhaps the finest in Germany, should also be mentioned. Hamover was the first place in Germany that was lighted with gas (1826). In the immediate vicinity of the town is the royal palace of Herrenhausen, whose beantiful granuds and gardens are open to the public.

since Hanger became a centre of the North German railway system, its manufactures have greatly increased in importance. Amongst the foremest industries are railway repair shops, ironfounding, typefounding, the manufacture of pianofortes, india-rubber goods, tobacco, linen, sugar, chocolate, hardware, brewing, and distilling. Pop. (1871) 87,641; (1880) 122,848; (1885) 139,746. Hanover is the birthplace of the brothers Schlegel; liftand the actor and dramatist; Louisa, queen of Prussia; Sir William Herschel; and the historiam Pertz. In the 14th century the town was a member of the Hanscatic League, and in the 15th it had a prosperons trade, which, however, declined considerably during the troublous times of the Reformation. From about 1640 its importance rested mainly on the fact that it was the residence of the duke and elector. The revival of its industry within recent years has also brought with it a revival of commerce. See works by Hartmann (1880) and Kalbe (1886).

Hanover, a post-village of New Hampshire, pleasantly situated near the east bank of the Connecticut, 55 miles NW. of Concord. It is the seat of Dartmouth College (1770), which is riehly endowed, and possesses a library of 65,000 volumes. It includes a medical school and the state college of agriculture and mechanic arts. Pop. 1134.

Hansard, a well-known name in connection with the printing of the British parliamentary records. Lake Hansard, born in 1752 at Norwich, came to London in 1779, and worked for some years as compositor in the office of Hughes, printer to the House of Commons, whom in 1798 he succeeded as sole proprietor of the business. He died in 1828; but his descendants continued to print the parliamentary reports down to the beginning of 1889. In 1837 a bookseller named Stockdale brought an action for libel against the Messrs Hansard, the libel consisting of statements in the parliamentary reports which the latter had printed, and after more than one trial the judges decided in favour of Stockdale. To obviate any similar ease an act of parliament was passed, directing that proceedings against persons for publication of papers printed

by order of either House of Parliament are to be stayed by the courts of law, upon delivery of a certificate and affidavit that such publication is by order of either Hunse. Colbett's Parliamentary History of England from 1006 to 1800 was continued from 1806 by the son and successors of Luke Hausard; and the name Hausard has been since then given to the printed reports of the debates in parliament. But the speeches there printed are not taken down by a special stad of shorthand writers; they are extracted in the gross from the London morning newspapers. They are usually sent to the peers or members by whom they were spoken for revision and correction. See Biographical Memoir of Lukr Hausard (1829) and Report of Select Committee of House of Commons (1828).

Hanscatic League, or Hansa, a politicocommercial association or league of cities in
the north of Germany and the adjoining states,
which flourished all through the middle ages.
Neither the circumstances out of which it grew,
nor the date of its origin, can be precisely determined. The original germs of the mion may undoubtedly be recognised in those fortuitous or temporary combinations of merchants, trading along
the same routes or in the same places, which were
formed for purposes of mutual protection, whether
from pirates at sea or from robbers on land, at anyrate from the thousand and one vexations and
dangers to which the isolated trader was in those
rude times constantly exposed. In course of time
more permanent associations were founded abroad,
partly for mutual protection, partly for the purpose
of securing from the rulers of the state they were
domiciled in more favourable canditions for trade,
partly in order to control the market and exclude
from participation in it all who were not members
of their own body.

The earliest guild of German merchants estab-

lished in a foreign country seems to have been founded in London in or before the 12th century. Certain it is that traders from Cologne were at that time settled there in the enjoyment of special trading privileges. This guild was viewed with favour by the English kings, who from time to time conferred upon its members valuable prerogatives and advantages, in return for services which the wealth and connections of the guild allowed it to render to them. Thus it was with money barrowed from them that Edward III, carried on his eaupaigns in France. This royallyfostered colony of Easterlings (whence 'sterling,' from the purity of their coined money), as they were called by the English, subsequently, about 1474, developed into the powerful association known as the Merchants of the Steelyard. Other guilds existed later at Boston, Hull, York, &c. Another important centre of the Hunscatic cities in the early years of their confederation was Wisby, on the island of Burnholm in the Baltic. Here, although the guild embraced merchants from several towns, the influence of Lubeck reigned supreme, as that of Cologne did in London. This station was the chief depôt for the trade with Russia, and with the German colony of Livonia, the name given at that period to all the eastern seaboard of the Baltie as far north as the Gulf of Finland. Wishy was also the mother-city of a no less important Hansentie settlement at Novegorod, near Lake Ilmen, in Russia. At Witten, in the province of Skåno, the southern portion of Sweden, which during the greater part of the middle ages belonged to Denmark; at Bergen, on the west coast of Norway; and at Brages in Flanders there were Hanseatic depôts of first-rate importance, besides numerous others of secondary consequence scattered along the shores of the North and Baltic seas. Most of these trading-colonies were governed by their own

code of laws and customs, different from those of the country in which they were established. In fact each of them was to all intents and purposes an independent state within a state. As a general rule the members of the colony were not allowed to marry, were put through rough and trying initiation ceremonies, had to work their way up through the various grades of the guild, and after serving a the various grades of the guild, and after serving a certain number of years had to give place to new-comers from the mother-cities at home; whilst the regulations governing their domestic life, their style of housing, eating and drinking, and amusing themselves, were very similar to those which prevailed in the monasteries of the time.

But there was another and more important phase of the movement-viz, that which developed itself at home. At first the individual cities seem to have acted almost independently of each other in founding trading-colonies abroad; at all events the influence of Cologue was for some time supreme in London, and that of Lübeck supreme in Wisby. But gradually merchants from other commercial towns of Germany were admitted to share the prerogatives of the guild and colony. This spint of association reacted in turn upon the mother cities, and about the middle of the 13th century, under the cementing force of a close community of interests, the large trading cities of north Germany began to co-operate together in leagues, more or less officially constituted. Amongst the earliest of supreme moment was that formed, at the period indicated, between Hamburg and Lübeck (1241) for the protection of the highway connecting the two cities. When, however, Lubcek, which had rapidly acquired a leading position among the commercial towns of north Germany, desired to enter the league of towns which had allied thementer the league of towns which had allied themselves with Cologue, the latter city strove hard to exclude her, but in vain. From this time dates the introduction of a political element into the league. Lübeck soon formed alliances with the Wendish towns on the Baltic, lying to the east—viz. Wismar, Rostock, Stralsund, and Greifswald. The Saxon and Westphalian towns, which had already banded themselves together in separate and independent confederations, joined the principal league, at the head of which Lübeck soon placed herself by common consent of the rest; and placed herself by common consent of the rest; and the Prussian towns associated themselves about 1340 with those of Westphalia. The cities of the principal league did not, however, form a democratic confederation of municipal states with a regular, well-conceived constitution, such as we find in confederated states at the present day. The first and principal object of the association was to maintain a monopoly of trade, by jealously excluding all rivals, in such countries as Russia, Norway, and the south of Sweden, as well as to preserve in their own hands the special commercial prerogatives which they had managed to acquire in comtries like England and Flanders. Thus, in the beginning their interests were mainly concentrated when their properties and what upon their colonies and trading-depôts, and whatever foreign policy they may have had was shaped by the necessities of protecting or furthering those interests, which were of course of a purely commercial character. Yet, as their wealth in-creased, and therewith their political influence, these Phonicians of the north began to pursue other than mere ordinary mercantile aims. Norway, for instance, they insisted that the entire trade of the country, at least of the northern and western portions, should pass through their depôt at Bergen, where they ousted the native Norwegians from their own wharves and warehouses, seized upon their trade, and refused all obedience to the civic anthorities of the town. And in Russia their behaviour was not a whit less arbi-

trary and high-handed. But the first awakening of the league to the consciousness that it was the possessor of real political power came in 1370, when it brought King Waldemar of Denmark, the most powerful and energetic sovereign on the Baltic shores, to his knees, and imposed upon him a humiliating peace. For many, many years rela-tions between the Hanseatic merchants and the Danes had been, and continued to be, those of latent or open hostility, for the Danes were the only serious rivals the Hansa had to encounter, and Denmark had, as now, control of the Sound and the Belts, besides holding possession of the south of Sweden, off whose coasts the great herring fisheries, one of the principal sources of wealth to the Hanse merchants, were in those ages carried

From the peace of Stralsund (1370) the Hanseatie League claimed the right of controlling the election of each successive sovereign who was crowned king of Denmark. And by the 16th century its officers had advanced so far in statecraft, and the league itself had acquired so much political influence, that it was able to depose the king of Denmark that it was able to depose the king of Denmark (Christian II.), and bestow, not only his crown, but also that of Sweden, upon candidates of its own nomination. Yet its power was then already a century on the wane. This result was brought about by the co-operation of a variety of causes, chief amongst which were the following. The discovery of America and of the sea-route to India struck the severest blow at the Hansa by diverting the stremn of commerce from the Baltie to the Atlantic shares of Europe. Amongst other changes, it caused a falling-off in the demand for furs, a staple commodity of Novgorod; while towards the middle of the 15th century the herrings eeased to enter the Baltic in such large quantities, but began to direct their comse instead to the coasts of Holland. The Dutch members of the league broke away from it early in the 15th century, and by adapting themselves to the altered conditions of the age, soon rose to be formidable rivals of their former associates. The English too ware laying the foundations of their guiltenance. were laying the foundations of their subsequent commercial supremacy, and in 1598 Elizabeth deprived the Steelyard merchants of all their privi-leges, and banished them from the country. The discovery by Sir Richard Chancellor of the sea-ronte to the White Sea struck a fatal blow at the monopoly hitherto enjoyed by the Hanse merchants in the trade with Russia. The conversion of so many European nations to Protestantism greatly lessened the demand for dried and salted herrings in Lent, as well as for wax for candles, which the Hanse merchants imported in large quantities from Novgorod. In the middle of the 16th century the 'contor' or depôt of Bruges was removed to Antwerp, where, however, the old-fashioned methods of doing business still practised by the Hanse merchants were unable to compete successfully against the more modern and enterprising methods of the Dutch and the Flemings. And unity no longer prevailed within the league itself, for, whilst Libeck ching with jealous tenacity to the antiquated conservative policy of the past, Hamburg insisted upon conforming itself to the newer conditions of the age; and several of the other towns, finding that the advantages which had formerly accrued to then from their participation in the leagne were no longer reaped by them, fell off from it one after the other. But the decay must also be attributed in large measure to the advances made by the states of Europe in the knowledge and application of the principles of government; whilst the more perfect preservation of public order, and the removal of many of the vexations impediments to the free circulation of commerce, deprived

the league of its most efficient raison d'être. Finally the Thirty Years' War occasioned an entire derangement, and even at times cessation, of all trade relations, a state of things from the evils of which the members of the league never were able to recover. From 1628 onwards the only cities which made any real endeavours to revive the once powerful association were Lüheck, Hamburg, and Bremen. But the resuscitated league, even after its confirmation by the treaty of Vienna in 1815, was more a thing of name than of reality; and in the 19th century Hanseatic cities was not so much the collective title of a combination of towns for trading purposes, as a common name for the independent republican municipal states of Hamburg, Bremen, and Lübeck. In 1870 each of these was made an integral part of the German empire, and by 1889 all had joined the German imperial customs union.

The administration of the affairs of the league was in the hands of deputies representing the constituent towns of the confederation, who met together at least once in every three years, though as a general rule every year, at one of the towns of the league, usually at Lubeck, at which town the archives of the Hansa were always preserved. These assemblies represented the political corporation of the Hansachic cities; they determined the amount of the duties to be levied on imported and exported goods, lixed the amount of the poriodical contributions to be paid by the several towns to the common treasmy of the league, decided all questions of peace and war, settled all internal quarrels between the members of the league, and punished disobedient or offending towns by fine, or, in the last instance, by exclusion from the Hansa, called 'unhansing.' As it was always the practice for towns to join the confederation and withdraw from it at their own will, it is not possible to state the precise number of towns which constituted the league. The war against Waldemar of Denmark, which took place when the Hansa was at the summit of its power, was waged by at least seventy-seven cities, though probably the league embraced more than these. See histories of the league by Sartorius (1802-8), Lappenberg (1851), Barthold (1862), and Helen Zimmern (in English, 1889); also the Hanse-Revesse, or official proceedings of the assemblies (1873 et seq.).

Hansi, a town of the district of Hissar, in the province of the Punjab, about 80 miles NW. of Delhi, was a British cantonment from 1802 down to the Mutiny (1857). Pop. 12,656.

Hansom. See CABS.

Hansteen, Christoph, a Norwegian astronomer, was born at Christiania, 26th September 1784. In 1814 he was appointed to the chair of Mathematics in the university of Christiania, and there, in 1819, published his famous work, Investigations into Terrestrial Magnetism, the methods of observation described in which have been generally followed since, and which he himself applied in the course of a journey to the east of Siberia in 1828-30. The scientific results of this journey were published in 1803. In 1821 he discovered the 'law of magnetic force' (see Magnetism). It was chiefly by his initiative that the astronomical and magnetic observatories at Christiania were founded. He was also professor of Mathematics in the School of Artillery, superintendent of the triangulation of Norway, and reorganiser of the national system of weights and measures. He died at Christiania, 11th April 1873. He published lectures on astronomy, a work on mechanics, another on geometry, several on terrestrial magnetism, and numerous memoirs, of which the greater part are inserted in the Magazin for Naturvidenskaberne.

Hanumân is the name of a fabulous monkey, who plays a great rôle in the legendary history of the second or classical period of Hindu mythology. He is represented there as the stremmons friend and ally of Vishmi, when the latter, in his incarnation as Râma, made his expedition to Ceylon, in order to recover his wife Sitâ, carried off by the giant Râvana. In the war between Râma and Râvana, Hanumân, ou one occasion, is related to have bridged over the ocean between the continent of India and Ceylon with rocks of a prodigious size, which he and his friends threw into the sca. See Entellus Monkey, Vishni.

Hanway, Jonas, an eccentric English traveller and philanthropist, born at Portsmonth in 1712. Apprenticed at seventeen to a Lisbon merchant, he afterwards traded at St Petersburg, and in the September of 1743 left that city on an adventurous journey through Russia and Persia, returning in the July of 1750. He published an account of his travels in 1753, and spent the rest of his life mostly in London as one of the commissioners for victual. ling the navy from 1762 to 1783. He was an unwearying friend to chimney-sweeps, parish infants, and infortunates, and advocated with carnestness solitary confinement for prisoners, and a milder system of punishment generally. Further, he deserves grateful remembrance for having written Further, he down the giving of vails, and as the first Englishman to carry an umbrella at home in spite of the interested insolence of the backney-coachnen. His attack on tea-drinking was less successful, but here he had the honour to be opposed by I'r Johnson, who for once replied to an attack by answering Hanway's angry answer to his review of his Essay on Ten. Elsewhere Johnson said that Jouas by tender the sound of the sound of the sound of the sound reprired some reputation by travelling abroad, but lost it all by travelling at home. He died September 5, 1786. See Pugh's Remarkable Occurrences in the Life of Jonas Hanway (1787).

Hanwell Asylum, the lunatic asylum for the county of Middlesex, is situated, not in the parish of Hanwell, but in the adjoining parish of Norwood, 74 miles W. of Paddington Station, London. It was originally founded in 1831, and now gives shelter to about 1800 patients.

Han-yang. See HANKOW.

Maparanda, a town in the Swedish province of Norrbotten, 14 mile from the mouth of the river Tornes, and opposite the Russian town of Tornes. It is the commercial outlet for the northernmost province of Sweden, and possesses a meteorological station. Pop. 1150.

Hap'lodon (lit. 'simple toothed'), a terrestrial rodent peculiar enough to be formed into a family by itself, and regarded as a connecting link between beavers and squirrels. It is represented by a single species (H. rufus), restricted to 'a small area on the west coast of North America, in Washington and Oregon territories, and a portion of California.' The aborigines called it 'Showt'' or 'Sewellel,' the trappers the 'Boomer' or 'Mountain Beaver.' The animal is plump, with broad head, short limbs, and hardly any tail; measures about a foot in length; and has a brownish colour. It lives socially in colonies, burrows underground, and lives on vegetable matter. As a connecting-link Haplodon is of much interest to naturalists, while the Indians use its skin and probably also its flesh.

Mapsburg, or Habsburg, House of, of which the imperial family of Austria are the representatives, dorived its name from the eastle of Habsburg, or Habichtsburg (Hawk's Castle), on the Aar, in the Swiss canton of Aargun. The eastle was built by Werner, Bishop of Strasburg

(1001-29).The real founder of the family was, however, Albert, who is mentioned in the annals as Count of Hapsburg in 1133. He was appointed landgrave of Upper Alsace, lord of the Zurieh hundred, and suzerain of various abbeys by the Emperor Frederick I. Under him and his son, Rudolf I., the family became one of the most Rudolf I., the rainty became one of the most powerful in Swabia, including under their rule the territories of the bishops of Constance, Strasburg, Basel, Coire, Lansanne, and those of the abbot of St Gall, with some temporal fiefs. After Rudolf's death in 1232, his sons, Albert IV. and Rudolf II., divided their father's possessions—Rudolf becoming the founder of the Hapsburg-Lauffenlurg line, This live again divided into the hapsburg-strict. This line again divided into two branches, which became extinct in 1408 and 1415 respectively. Albert IV. laid the foundation of the future greatness of the House of Hapsburg. His cldest son, Rudolf III. (Rudolf I. of Austria), who sueeeeded him, and who was subsequently (1273) elected emperor, by appropriating the provinces which he had wrested from Ottocar of Bohemia—viz. Upper and Lower Austria, Styria, and Carniola—greatly increased the power of his family. To the family sterritories were added in 1336 Carinthia, and in 1364 the Tyrol. On the death of Rudolf IV. (1365) the house divided into the Austrian and Styrian branches; but the former became extinct in 1457, whilst the latter have worn the imperial crown almost uninterruptedly down to the present time (see AUSTRIA, GERMANY, and SPAIN). Meanwhile the original family possessions were gradually all orbids by the Spains and Spains. absorbed by the Swiss confederated cantons (1386-1474). In 1881 the Austrians proposed to purchase the eastle of Hapsburg and give it as a wedding gift to the Crown prince of Austria; but the people of Aargan refused to hear of the sale.—Compare Prince Lichnowski, Geschichte des Hauses Habsburg (1837); also Coxe's House of Austria (1807).

Harar, a city of Africa, in the country of the Gallas, about 200 miles WSW. of Berbera, stands on the slopes of the mountains which surround it, Mount Hakim on the west rising to \$400 feet. It is fenced with a low wall and forts, the wall being pieced by five gates. The streets are simply water-channels crossing the nueven surface. face; the houses are partly stone edifices, partly groves and coffee gardens. Formerly the place was a commercial centre of considerable importwas a commercial centre of considerable importance, but it has now lost a good deal of its trade to Tadjura and Berbera. Coffee, hides, eattle, and a dyestuff called wars, are the principal objects of commerce. The population number about 37,000, of whom two-thirds are females. They include native Harari (nearly one-half), Gallas, Somali, and Abyssinians. The Harari, though physically resembling the Abyssinians, differ both in their dress and manners from all their neighbours, but are applied becoming their neighbours. their neighbours, but are rapidly becoming assimilated in these respects to the Arabs. Their language would seem to belong to the Hamitic division, and is probably a descendant of the ancient Ge'ez, though Arabic is replacing it for commercial purposes. Harar, which was converted to Islam in 1521, was formerly the capital of an independent state. In 1875 it was conquered by the Egyptians, who, however, handed it back to its native emir the same year. See Paulitsehke, Harar (1888).

Harbour, an inlet of the sea, so protected from the winds and waves, whether by natural conformation of the land, or by artificial means, as to form a seenre roadstead for ships. It is with harbours which are wholly or in part artificial that this article deals.

Harbours may be divided into harbours of refuge

and those for commercial purposes. The latter are often merely tidal-i.c. eapable of being entered by vessels only at certain states of the tide, and where the vessels rise and fall with the tide. former are roadsteads of good depth, protected by breakwaters, and accessible at all times of tide, where ships may take refuge during storms. two kinds are sometimes combined, there being the harbour proper, and a capacious protected roadstead outside of it, as at Cherbourg and else-

With the birth of commerce and naval warfare, in the earliest ages of civilisation, arose the necessity for artificial harbours. The Phonicians, the fathers of navigation, soon set to work to protect their scanty strip of Levantine coast. At Tyre two harbours were formed, to the north and to the south of the peninsula on which the city was alread At Silve civil so but he are the coast. placed. At Sidon similar but less extensive works lung testified to the wealth and engineering genius of the Phænicians. The breakwaters were princi-

pally constructed of loose rubble.

Carthage, in another part of the Mediterranean, also possessed a harbour, in two divisions, formed by moles, and connected with one another by a canal 70 feet wide. On the inner harbour stood canal 70 feet wide. On the inner harbour stood the arsenals, with room around them for 220 warships. Still keeping to the great inland sca, we come to Greece; but here nature had provided so many navigable inlets that little remained to be done by man. Nevertheless, some minor works were excented at the Pirans and elsewhere, chiefly, of course, for warlike purposes. The Romans, finding ships necessary to the dominion of the world, set about constructing barbours for them, in their usual solid and workmanlike manner. The coasts of Italy still show how well they undercoasts of Italy still show how well they understood both the principles and the practice of this branch of marine engineering. Below is given a plan of the ancient port of Ostia, at the mouth of the Tiber (now more than two miles inland), one of their finest and most complete undertaking of their finest and most complete undertaking the complete of their finest and most complete undertaking the complete of their finest and most complete undertaking the complete of their complete or their com takings of this nature. A distinguishing feature

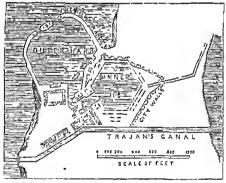


Fig. 1.-Ancient Harbour of Ostia,

of their harbour-making is the open or arched mole. Built with open arches, resting upon stone piers, it gives full play to the tidal and littoral currents. thus preventing the deposit of sand or mind; but in proportion as this advantage is increased (by increasing the span of the arches), so also is the agitation, and consequent insecurity, of the water within. The decay of commerce and civilisation, consequent upon the fall of the Roman empire, put a stop to harbour-making; nor could any want of the art be felt until the revival of commerce by the Italian republics of the middle ages. But the rich traffic of Venice and Genoa soon led to the construction of suitable ports at those places; and the moles of the latter city and the works in the lagoons of Venice remain to this day. France was next in the field, embauking, protecting, and deepening the months of the rivers along her north-western shores, as at Havre, Dieppe, Dunkirk, &c. In 1627, during the siege of Rochelle, Metezean constructed jetties of loose rubble-stone,

to prevent access to the city.

Meanwhile, Britain, whose ocean-commerce is of comparatively recent date, lagged far behind her continental rivals. With few exceptions her ports were absolutely unprotected, or rather uncreated; and this state of things continued until late in the 18th century. Two of the few exceptions were Hartlepool, where a harbour was formed about 1250, and Arbroath in 1394. In the 17th century, at Whithy and Scarborough rough piers were thrown ont, protecting the mouth of the port; while at Yarmouth a north jetty and subsequently a south one were formed. An ancient mole existed at Lyme Regis, a section of which, from Smiles's Lives of the Engineers, is given below (see fig. 3). But the chief efforts of the early English engineers were directed against the shoals and waves of



Fig. 2.—Dover Harbour in the time of Henry VIII.

Dover. When, however, Smeaton rose to vindicate the engineering talent of England, things took a different turn; and now few countries surpass Great Britain in the number of artificially improved

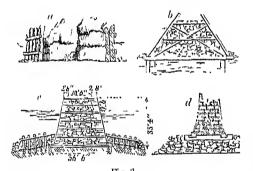


Fig. 3. a, ancient pier at Lyme Rigis; b, wooden-hamed pier, filled with rubble; c, pier at Havre, with apron; d, masomy pier, on rubble foundation.

commercial harbours, or in the just appreciation

of their importance.

In the construction of harbours the great desiderata are sufficient depth of water and perfect security for the vessels likely to frequent them, together with the greatest possible facilities for ingress during any weather; while the chief obstacles to be surmounted are the action of the waves upon the protecting piers and breakwaters, and the formation of sandbanks and bars, which diminish the depth of water at the entrance and also within. The designs of harbours, as has been abeady indicated, may be classified under the following heads: (1) harbours of refuge and anchorage breakwaters; (2) deep-water and tidal harbours for commercial purposes; (3) piers, either straight, or kanted, or curved; (4) quays or whatves.

These different works are obviously spited for different localities, and for contending with different Quays are clearly suited for the most expositres. exposites. Quays are clearly somed for the most sheltered situations only, and the engineer must consider, when designing a halbour, which type of harbour will be most economical and effective. In coming to a decision the mature of the traffic, the exposure, and the geological features of the coast must be carefully considered. A good chart or marine survey furnishes valuable evidence as to the force to which barbour works will be exposed. Among the points to be noted is the line of maximum as well as the depth of water, in front of the har-bour. Thomas Stevenson proved by observations that the waves increase in the ratio of the square that the waves therease in the ratio of the square root of their distance from the windward shore as measured along the line of exposure, and he gives the following simple formula: Where h = height of wave in feet during a strong gale, and d = lengthof exposure in miles for distances of, say, 10 miles and inpwards, then $h = 1.5 \sqrt{d}$. The heights 50 obtained will be increased when they pass into conrerging channels, and decreased when they pass into expanding channels. The greatest measured height of the waves was by Scoreshy in the Atlantic Ocean, where he found billows of 43 feet in height Ocean, where he found billows of 43 feet in height from hollow to crest, and 36 feet was not an uncommon height. At Wick, Caithness-shire, waves of about 40 feet bave struck the breakwater. Amongst the greatest recorded forces exerted by the waves may be mentioned the breaking or quarrying out of its position in situ of a mass of 13 tons on the Skernies of Whalsay, in Shetland, at a level of 74 feet above the sea—this height, of course, being reached by sliding. But the most astonishing feat reached by sliding. But the most astonishing feat of which we have any knowledge was at Wiek breakwater, where in the winter of 1872 a mass of masonry, concreted together as a monolith, and hound with iron has 44 inches in diameter, and weighing no less than 1350 tons, was torn from its seat in the work, and thrown to leeward.

Thomas Stevenson devised an instrument called the Marine Dynamometer for ascertaining numerically the force which is exerted by the waves in the Atlantic and German oceans. He found that the mean of his observations during winter was more than three times that exerted during summer, the maximum force recorded being 31 tons per

square foot.

Various local causes materially affect the height, and therefore the force of the waves, In some cases, where a strong enrrent runs past the coast, as at Sumburgh roost in Shetland, it causes a dangerous breaking sea in the current, and while this roost or race continues to rage the coast under lee is comparatively sheltered; but when the force of the tide is exhausted and the roost disappears, a heavy sea rolls in upon the shore. It is this encounter between the ground-swell waves of the occan and the current of tide or land water which causes miniature races at the mouths of rivers.

Another most material element in the question of exposure is the depth of water in front of the harbour; for, if that depth be insufficient to admit of the transmission of the waves, they break or spend themselves before they reach the piers. Thus, Leslie found at Arbroath harbour that the works were not so severely tried by the heaviest waves as by others of lesser size which were not tripped up and broken by the ontlying rocks. the bar is more disturbed by ordinary waves than It thus appears that the during great storms.

largest waves are not always so destructive as smaller ones. Scott Russell has stated the law that waves break whenever they come to water as deep as their own height; so that 10-feet waves should break in 10-feet water, and 20-feet waves in 20-feet water. There seem, however, to be some waves which break on reaching water whose depth is equal to twice their own height. Proofs of the depth to which the surface undulations extend have been given by Sir George Airy, Sir John Coode, Captain Calver, and Mr John Murray, C.E. Rankine has shown that the crest and trough of the sea are not, as was generally believed, equidistant from the level of still water. When l is the length of the wave, H its height from trough to crest.

Crest above still water
$$=\frac{H}{2} + 7854\frac{H^2}{I}$$
.

Trough below still water $=\frac{H}{2} - 7854\frac{H^2}{I}$.

It has been held by some engineers that in deep water waves are purely oscillatory, having no power of translation, and therefore incapable of exerting any force against a vertical face of masonry. This, however, is incorrect. Were there no wind propelling the

waves, no current to in-terfere with their character, and no interference with one another, such as the reflected wave from a vertical face meeting the next opposing wave, such a theory might be true. True, however, it is not; and all sea works, in whatever depth of water they may be placed, will assuredly have to withstand impulsive action. ministre action. Desides, it must be kept in view that in order to reduce the expense of construction it is essential, where the lottom is soft, to make the foundation a pile of loose rubble or concrete blocks. It follows from what has already been said that the mbble, by shoaling the water in front of the work, will cause the waves to become waves of translation before they reach the vertical superstructure, which, assuming the waves to have been simply oscillatory, would have reflected them without breaking, and therefore without their having exerted

an impulsive force further than statical pressure

npon the masonry.

There is no fixed rule as to the liest mofile of any sea-work, which must necessarily depend upon a variety of local peculiarities, such as the nature of the bottom, and the size and quality of the materials obtainable. While a long, sloping breakwater does not offer the same amount of resistance to the waves, neither is it in itself so strong, for the weight resting on the face-stones is decreased in proportion to the sine of the angle of the slope. On the other hand, the tendency of the waves to produce horizontal displacement, supposing the direction of the impinging particles to be horizontal, is proportional to the appearance of the sine of the same of the is proportional to the cube of the sine of the angle of clevation of the wall.

In tidal harbonis, or those in shoal-water, it is admitted by all that the waves break, and therefore evert an impulsive force. Such works have to withstand (1) the direct horizontal force which tends to remove the masonry; (2) the vertical force acting upwards on projecting stones or protuberances, and against the lying beds of the stones; (3) the vertical force acting downwards upon the talms wall, or passing over the parapet and falling upon the roadway; (4) the backdraught, which is apt to remove the soft bottom in front of the work; and (5) the blowing action of waves on the air or water which fills the interstices of open-work piers.

stices of open-work piers.
In designing the ground-plan of harbours, some rules should be kept in view: (1) the entrance should be always kept seawards of the works of ma-anry, cane being taken that the direction of the piers does not throw the sea across the entrance; (2) there should be a good 'loose,' or point of departure free of rocks or a lee-shore; (3) spending beaches inside should be provided to allow the waves that pass in to break and spend themselves. A harbour basin surrounded with vertical quay walls becomes a 'boiling pot;' this is a point frequently overlooked by engineers; (4)

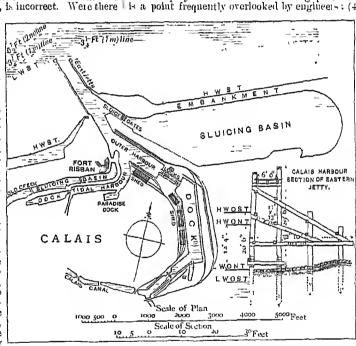


Fig. 4. — Calais Harbour.

the relation of the width of entrance to the area of a harbour should be a matter of careful study, as a harbour should be a matter of careful study, as upon this depends the tranquillity of the interior, or what has been called the reductive power of the harbour. Stevenson's formula for the reductive power is given below: H = height of wave at entrance; b = breadth of entrance; B = breadth of harbour at place of observation; C = constant is the property of wave at place of observation; C = constant is the property of wave at place of observation. reduced height of wave at place of observation.

$$x = \frac{\text{H} \sqrt{b}}{\sqrt{B}} - \frac{(\text{H} + \text{H} \frac{\sqrt{b}}{\sqrt{B}})\sqrt{1}}{50}.$$
 represents the harbour of Cala

Fig. 4 represents the harbour of Calais, which was constructed by the French government, and opened on 3d June 1889. Great difficulty was experienced in keeping the entrance free from sand, the old shiring basin being found quite iundequate for the purpose on account of its distance from the entrance. The large basin constructed has proved more effective, enabling much

Rendel's plan of depositing rubble from open stages of pile-work is frequently used in the

construction of deep-water piers.

The cross-sectional form of breakwaters depends naturally on the depth of water, exposure, and the materials that can be most easily obtained. The system of bringing up a rubble mound to within 12 or 18 feet of low-water level, and then forming a masonry wall on this base, was adopted at Portland, Alderney, Wick, Holyhead, and other places; while at Dover and Aberdeen the wall with a slight batter has been brought up from the bottom. introduction of Portland cement concrete in comparatively recent times, as described in the article BREAKWATER (Vol. II. p. 415), has greatly facilitated the work of the burbour engineer.

The commercial value of a harbour increases, according to Stevenson, not simply as the depth of the water is increased, but as the cube of the depth. Hence the great expense which is willingly incurred for securing even a foot or two of additional depth. The greatest achievement in deepening is at the Tyne, where Ure dredged out the channel to 20 feet at low-water all the way up to Neweastle. In 1889-90 Messrs Stevenson of Edinburgh were deepening the lower reaches of the Clyde to 23 feet at low-water spring tides. Scenring is also employed for increasing the depth, as by Sir W. Cubitt at Cardill, where 2500 tons of water a minute are let ell. Rendel's scheme for Birkenhead was based simply on the quantity liberated and the sectional area of the channel, and was therefore eperative for any distance, and did not depend on the propelling head, or on the direction in which the water left the shuices, which contiders are the continuous control of the continuous control of the control of t ditions regulate ordinary sconring on the small scale, and which is ellications for only short distances from the outlet.—Docks (q.v.) of various kinds are connected with harbours.

Pine timber is admirably adapted for soft soils,

when the exposure is not great, but, owing to the ravages of the Teredo navadis and Limnoria terebrans in localities where there is no admixture of fresh water, it is soon destroyed. Greenheart, African oak, and bullet-tree are little affected by the worm, as shown by experiments made in 1814 at the Bell Rock by Robert Stevenson. Even limestone and sandstone are perforated by the Pholades and Saxicave. Metals also suffer from elemieal action when immersed in salt water, George Rennie's experiments showed that wrought iron resists this action better than cast in the ratio of 8 to 1; while Mallet's experiments show that from 7 th to 1 th of an inch in depth of castings 1 inch thick, and about 10 ths of wrought iron, will be destroyed in a century in clean salt water. A cannon-ball 41 inches in diameter became oxidised to the extent

of 3ths of an inch in the century.

See Breakwater, Docks, Coaling Stations, and the articles on Calais, Cherronne, Dover, Havre, Holy-Head, Peterrena, Plymouth, Portland, &c.; also Sir John Rennie's book on Harbours (4 vols. 1851–54); Thomas Stevenson, Design and Construction of Harbours (3d ed. 1886); I. F. Vernon Harcourt, Hurbours and Docks (2 vols. 1885); and the Minutes of Institution of Civil Engineers, passim.

Harbour Grace, a port of entry and the second town of Newfoundland, on the west side of Conception Bay, 84 miles by rail WNW. of St John's, has a large but somewhat expessed harbour, with a revolving light, and carries on a considerable trade. It is the sent of a Roman Catholic

bishop, and contains a Catholic cathedral and convent. Pop. 7054.

Harburg, a scaport of Prassia, in the province **Harburg**, a seaport of Prussia, in the province of Limeburg, is situated 5 miles S. of Hamburg, on the Elbe. Its industries include gutta-percha goods, palm-oil, cotton-seed oil, saltpetre and other chemicals, artificial manure, walking-sticks, leather, mineral water, machines, beer, and jute. Since the deepening of the Elbe the commerce of Harburg has greatly increased. It is a place of holiday resort for the Hamburgers. Pop. (1875) 17,131; (1885) 22,344.

Harcourt, Sir William Vernon, the second son of the late Rev. William Vernon Harcourt of Nuncham Park, Oxfordshire, and grandson of a former Archbishop of York, was born October 14, 1827, and educated at Trinity College, Cambridge, where he graduated with high honoms in 1851. He was called to the bar in 1854, went the Home Circuit, and was made a Queen's Connsel in 1866. It was during this period that he acquired distinction by his contributions to the Saturday Review, and his letters in the Times under the signature and his letters in the Limes under the signature of 'Historieus.' After unsuccessfully contesting the Kiykenldy burghs, he was returned to parliament for the city of Oxford as a Liberal in 1868. The following year he was elected professor of International Law in the university of Cambridge. He took an independent tone in the House of Commous, sometimes attacking both friends and foes. But the undoubted mark which he made by his abilities and oratory caused him to be appointed solicitor-general in November 1873, when he received the honour of knighthood. He held office until Mr Gladstone's retirement in February 1874, and when that statesman returned to power in 1880 he was appointed Home Secretary. On seeking re-election at Oxford, however, he was defeated, but was abnost immediately returned for Derby upon the apportune retirement of Mr Plimsoll. During the session of 1880 Sir William pilated the Ground Game Bill through the House of Commons, and in 1881 he introduced the Ams Bill (Ireland) in a speech which was strongly resented by the Irish members. He brought in the Provention of Crimes Bill (1882) and the Explosives Bill of 1883, which dealt summarily with dynamite outrages. He next made an abortive attempt to grapple with the municipality of London. The ministerial policy in the Soudan he defended with much skill on various occasions. In 1885 Sir William went out of office with his chief, but returned with him on the advent of the Liberals to power in 1886, when he was appointed Chancellor of the Exchequer. He again went out of office with his colleagues in July of the last-named year. The letters of 'Historiens' were published in volume form, with considerable additions, in 1863. An able speaker and vigorous debater, Sir William Harcourt has been conspicuous for his defence of Mr Gladstone's Trish Home-rule scheme.

Hardenberg, Heinrich von. See Novalis. Hardenberg, Karl August, Prince von, a Prassian statesman, was born at Essenvola, in Hanover, May 31, 1750. After labouring for twelve years (1770-82) in the service of Hanover and eight in the service of Brunswick, Hardenberg chanced to attract the attention of Frederick-William II. of Prussia. On his recommendation he was upprinated administrator of the principality of Ansbach and Bairenth, and after the union of this latter to Prussia in 1791 was appointed a Prussian minister of state and a member of the cabinet ministry. In this capacity his chief work was the negotiation of peace between Prissia and the French Republic at Basel in 1795. On the accession of Frederick-William III, in 1797,

Hardenberg was entrusted with the management of important branches of internal affairs, and in 1803 became first Prussian minister. The principal aim of his policy was to preserve neutrality in the war between France and England; but in 1806, when Prussia was coerced by Napulcon into becoming his ally, Hardenberg was dismissed. In 1810, however, he was appointed chancellar of state in suecession to Stein (q.v.); and although Piussia was at this period in a deplotable condition, humbled in the very dust before France, Hardenberg addressed himself to the task of completing the internal reforms begin by his predecessor. In the war of liberation he took a prominent part, and saw his efforts crowned by the treaty of Paris, June 1814. Soon after he was raised to the rank of 1814. Soon after the was raised to the rank of prince. He accompanied the allied sovereigns to London, took part in the proceedings of the congress at Vienna, and in the treatics of Paris (1815). In 1817 he reorganised the council of state, of which ho was appointed pre-ident. He was also present at the congresses of Aix-la-Chapelle, Carlsbad, Vienna, Lanbach, and Verona; and drew up the new Pressian existent of innoces. Thereof the new Prussian system of imposts. During a tour through the north of Italy he was taken ill at Pavia, and died at Genoa, 26th November 1822. To Hardenberg Prussia is mainly indebted for the improvements in her army system, the abolition of seridom, of the privileges of the naldes, and of a multitude of trade corporations, the encouragement of municipal institutions, and the reform of her educational system. Yet in his later years he was unable to overcome the reactionary tendencies of the king; all he could do was to moderate them and prevent them running to excess. See Ranke's Denkwurdigkeiten des Fursten von Hardenberg (5 vols. 1877), which includes Hardenberg's own memoirs.

Harderwijk, a fishing-town of the Netherlands, on the south-east shore of the Zuider Zee, 31 miles NE. of Utrecht by rail. From 1648 to 1811 it was the seat of a university. It is now a depôt for recruits for the Dutch East Indian army. Pop. 7139.

Hardhead. See MENHADEN.

Hardicanute, king of England, son of Cannte the Great by Emma of Normandy, the widow of Ethelred II. At the time of his father's death (1035) Hardicanute was in Denmark, and the throne of England was given by the witenagemot to Harold, his younger brother; Wessex, however, was reserved for the absent prince, whose claims to the kingdom were uplied by Godwin and Emma. On the death of Harold in 1040 Hardicanute was elected king in his place; but he only reigned two years, dying of apoplexy in 1042. Yet in that short time he provoked the discontent of his subjects by the imposition of a very heavy danegold.

Harding, STEPHEN, the third abbot of the celebrated monastery of Citeaux, an Englishman by birth, who endeavoured to restore the Benedictine rule to its original simplicity. He died in 1134.

See CISTERGIANS.

Hardinge, Henry Hardinge, Viscount, British general and governor-general of India, was born at Wrotham, in Kent, 30th March 1785. Gazetted an ensign in 1798, he served all through the Peninsular war, fighting in most of its battles, being wounded at Vimiera and Vittoria, and taking a decisive part in the sangninary contest at Albuera. From 1809 to 1813 he was also attached to the Portuguese army as a deputy-quartermaster-general. On the renewal of bostilities after Napoleon's escape from Elba, Handinge hastened to join Wellington, who appointed him cammissioner at the Prussian headquarters. In consequence of a severe wound received at Ligny he was unable to take part in

the battle of Waterloo. From 1820 to 1844 he took an active share in parliamentary life, holding the office of Secretary of War under Wellington in 1828, and afterwards the chief secretaryship of Ireland under the same dake first and then under Peel. In 1844 he was appointed governor-general of India. It was during his tenure of office that the first Sikh war broke out. Governor-general Hardinge was present at the battles of Madki, Firozshah, and Sohaon as second in command to Lord Gough. After the peace of Lahore (1845) he was created a viscount, and granted a pension of £5000 by the East India Company as well as one of £3000 for three lives by parliament. Four years after his return to England he succeeded (1852) Wellington as commander-in-chief of the British army. In 1855 he was made field-marshal. In July of the following year he resigned the office of commander-in-chief, and on the 24th of September 1856 died at South Park, near Tunbridge.

Hard Labour. See Prison.

Hardness, Scale of. The hardness of a substance may be measured by many methods, and the order in which given substances would be classed as to hardness depends altogether upon the particular method used. Mineralogists classify substances according to their power of seratching others. By earrying a selected set of small specimens of certain minerals, they can at once find out the relative hardness of two unknown specimens which resemble each other so closely as to be otherwise undistinguishable at the time nuless more elaborate chemical tests be resorted to. See Mineralogy.

Hardouin, Jean, an eccentric classical scholar, was born in 1646, at Quimper, in Brittany, entered the Jesuit order at the age of twenty, and from 1683 filled the post of librarian of the college of Louis le Grand in Paris. In a spirit of eccentric scepticism, Hardonin maintained that the entire body of classical literature, with the exception of Cicero's writings, Pliny's Natural History, Virgil's Georgies, Horace's Satires and Epistles, Homer's Hiad, and Herodotus's History, was spurious, and had been written by the monks of the 13th century. He also rejected all the reputed remains of ancient art, together with the inscriptions and coins which are attributed to classical times; nay, he even extended his scepticism to the Septuagint version of the Old Testament, and to the Greek text of the New, the original language of which he held to have been Latin! Besides this, he condemned as apocryphal all conneils of the church anterior to the Council of Trent. Yet, with all this extravagance, Hardonin was a scholar of real attainments, and most of his works possess historical and critical value, particularly his edition of Pliny (5 vols. 4to, Paris, 1689). Of his remaining works, the most valuable is the Collectic Conciliorum (12 vols. folio, Paris, 1715); a commentary on the New Testament, in folio; and several volumes on munismatics and chronology. He died at Paris, September 3, 1729.

Hardwar (Hari-dwara, 'Vishum's gate'), perhaps the most famous spot on the Ganges, stands on the right or west bank of the river, at the point where it emerges from the sub-Himalaya into the plains of Hindhstan, 39 miles NE. of Saharunpur, North-west Provinces. From its position on the sacred stream, it attracts immense numbers of pilgrims for the purposes of ablution. The orthodox season comprises the end of March and the beginning of April—a great fair at the same time engrafting commerce on religion. In ordinary years the attendance is about 100,000; but every twelfth year (as in 1882, 1894, &c.) a peculiarly sacred feast takes place, attended by perhaps 300,000

(formerly by as many as 2,000,000). Hardwar is 1024 feet above the sea, and bas a pop. of 4520. See GANGES.

Hardwood Trees are forest-trees of comparatively slow growth, producing compact, hard timber, as oak, ash, elm, chestnut, walnut, beech, birch, &c. From these willows, elders, poplars, &c. are distinguished as saft-wooded trees. Neither term is extended to firs, pines, cedars, or other conferents trees.

Hardy, ALEXANDRE, a prolific French dramatist, born about 1570, in Paris, and from 1600 attached as playwright to the newly-started Théatre du Marais, for which he wrote from five to seven hundred pieces, of which hut forty-one are extant. He died about 1630. His plays were closely modelled on the Spanish examples before him, from their merits down to their bombast and overentanglement of plot, but still preserved something of classical form. The best is Marianne. A late edition is Stengel's (5 vols, Marburg, 1883-84).

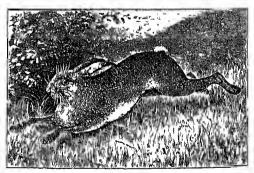
Hardy, Sir Thomas Duffus, a distinguished paleographer, was born in 1804, in Jamaiea, the son of a major of artillery. At lifteen he became a junior clerk in the Record Office in the Tower, and here, under Mr Petrie's instructions, he quickly became an expert in reading ancient MSS. His earliest writings—illustrating the reign of King John—appeared in Irchaologia and the Everpta Historica. In 1861 he succeeded Sir Francis Palgrave as deputy-keeper of the Public Records, in which capacity his learning was equalled only by his courtesy. He was knighted in 1870, and died in London 15th June 1878. His most important works were two folio volumes of the early Close Rolls (1833-44), one of the Patent Rolls (1835) and Charter Rolls (1837) for the Record Commission: William of Malmesbury (1840): Cutalogue of Lord Chancellors, Keepers of Great Scal, Master of Rolls, &c. (1843); Modus tenendi Parliamentum (1846); a Descriptive Cutalogue of MSS. relating to the history of Great Britain and Ireland (3 vols. 1862-71); Syllabus, in English, of Rymor's Federa (3 vols. 1869-85); Registrum Palatinum Dunchnense: and The Register of Richard de Kellawe, 1911-16 (4 vols. 1873-78).—His brother, Sir William Hardy, was born 6th July 1807, became a clerk at the Recond Office in the Tower in 1830, was transferred to the Duely of Lancaster Office in 1838, thence, on the removal, to the Public Record Office in 1868 as assistant-keeper. On his brother's death in 1878 he succeeded to his office of deputy-keeper, from which he rotired only in 1886. Already an F.S.A. in 1837, he was knighted on the last day of 1884. Among his works are an edition of Jehan de Wantin's Recensil des Chroniques et Juciennes Istories de la Grant-Bretaigne (4 vols. 1864-84), and a translation of vols. i. and ii. (1864-87).

Hardy, Thomas, a popular novelist, born in Dorsetshire, June 2, 1840. He was brought up as an architect, and practised some time at Dorchestor, next prosecuted his studies in design at London, gaining such professional distinctions as the prize and medal of the Institute of British Architects, and Sir W. Tite's prize for architectural design, both in 1863. His intention was now to become an art-critic, but the experiment of a not wholly unsuccessful work of liction, Desperate Rancalies (1871; new ed. 1889), finally shaped his destiny otherwise. His next novels, Under the Greenwood Tree (1872) and A Pair of Blue Eyes (1873), propared the way for his best work, Far from the Madding Crowd, which was published in the Cornhill Magazine in 1874. As a novel it is unequal, and lacks refinement in style, but possesses remarkable vigour and undeniable

Immour in the portrayal of Doisetshine peasant-life. Its immediate success seemed its author an andience for a series of succeeding novels, none of which have, however, yet equalled it. Among these are The Hand of Ethelberta (1876), The Return of the Native (1878), The Trumpet-major, his second-best novel (1880), 1 Landiecum (1881), Two on a Tower (1882), The Mayor of Casterbridge (1886), and The Woodlanders (1887). Itis Wessee Tules (1888) showed anew his quick eye for scenery, his humour, vigour, and mastery of complicated situations, marred also by a somewhat unsatisfactory handling of dialect, and a weakness for forced and far-fetched phrasing of epithet and simile.

Hardyng, or Harding, John, a 15th-century English thyming chronicler, was born in 1378, and was brought up in the household of Harry Percy, the famous Hotspur, whom he saw fall on Shrewsbury field in 1402. Pardoned for his treason, he served under Sir Robert Umfcaville, became constable of Warkworth Castle, fought at Agineourt, and served the crown in confidential and critical missions to Scotland. His chronicle, composed in limping stanzas, and treating the history of England from the earliest times down to the flight of Henry VI. into Scotland, he rewrote and presented to Edward IV. just after his accession. It is poor history and poorer poetry, but the account of the Agincont campaign has the interest of the eyewithess. For his hostility to the Scots he had apparently good grounds in his own experience. Hardyng's Chronicle was continued by the printer Richard Grafton down to the thirty-fourth year of the reign of Henry VIII., but Grafton's work was little more than u recast of Hall. The best edition of Hardyng's Chronicle and its continuation is that by Sir Henry Ellis (1812).

Hare, a term including all members of the rodent family Leporidae, with the exception of the rabbit. Its chief distinctive characters are as follows: four incisor teeth in the upper jaw (instead of two as in most Rodentia), two small square teeth standing immediately behind the well-known front teeth; live or six molars in the upper and live in the lower jaw, which are composed of two flat plates disposed transversely; lips thick, with a deep median incision and very mobile, with long bristles; eyes large; ears more or less long; head and body long and compressed; hind-legs long (except in Lagomys), five toes on the fore, four on the hind legs; tail short. The body is covered by a thick, almost woolly coat, which is in some demand for making hats. Two recent genera only are included, Lepus and Lagomys. The Common Hare (Lepus timidus) is about 27 inches in



The Common Hare (Lepus timidus).

length—of which only 3 inches belong to the tail—1 foot high, and weighs 13-20 lb. The fur consists of two kinds of hairs, one short, thick, and

HARE

woolly, the other longer and stonter. The calour, owing to the varying tints of these two sets of hairs, is a dull reddish-brown, paler on the sides and white below, which from its resemblance to the earth is admirably adapted to conceal the

The hare is in the main of nocturnal habits, and passes the day sleeping in its 'form,' a slight depression among the grass and other herbage, sheltered from the sun in summer and the wind in winter. In the evening it creeps out to feed, nearly all vegetable substances being palatable to it; green vegetables and noot-crops are, however, its special delicacies, though it will gnaw the bark off trees when hard pressed. In places where it is protected by game-law it does great damage on account of its voracity and fertility.

In addition to its protective colouring, caution and speed are the hare's security. Cronched in its form, on any sign of danger it at once sits up on its haunches and looks around; its next action is to haunches and looks around; its next action is to cronch down and try to conceal itself; should this fail and the enemy approach too near, it betakes itself to flight, in which its long hind-legs give it a great advantage in running either on a level or upbill; in descending it proceeds diagonally, otherwise its springs would overturn it. Its course is when an with accountage to a level law idea. chosen with great cunning so as to place all possible obstacles in the way of its pursuer, and though it does not take naturally to water it has been known to swim a considerable distance when closely pressed. It has many enemies; nearly all beasts and birds of prey will attack it, not to mention man, whose pursuit is treated in special articles (see COURSING; also GAME LIWS).

The time of pairing is in February or March, and at this period the pugnacity, which is even more a characteristic of this cautious animal than its proverbial timidity, comes into evidence, for the males fight feroclously for the females. The period of gestation is thirty days; there are three to five young (known as 'leverets') in each litter, and four (rarely five) litters are produced yearly; the first in March, the last in August. The young can see when born, and are only indifferently tended

by their mother for about a month.

The Common Harc is distributed over the greater The Common Hare is distributed over the greater part of Enrope and a small portion of western Asia, as far north as Scotland, south Sweden, and Persia, and as far south as France and north Italy. Three different local varieties have been recognised: (1) the South Enropean (L. mediturraneus, L. meridionalis), small, short, with looser hair of a reddish tinge; (2) the Mid-Enropean (L. tinidus a str. L. meningle), structure with (L. timidus s. str., L. campicola), stanter, with longer hair and hrownish-gray; (3) the Eastern form (L. caspicus), very thick-haired, and gray or whitish-gray in colonr.—The Irish Hare, formerly known as L. hibernicus, is not regarded as a distinct species by the best authorities, but as a variety of the Alpine hare.

The Alpine Hare (L. variabilis) is distinguished by its smaller size, the shortness of the ears, which are not so long as the head, the white tail about half the length of the head, and the form of the first upper molar. It occurs in the circumpolar regions as far south as 55° N. lat., and also in elevated positions in more temperate regions, such as the Alps, Pyrenees, and probably the Caucasus. As a British form it is confined to the north of Scotland and Cumberland. Three differnorth of Scotland and Cumberland. Three different varieties have been described: (1) the Polar, white both in summer and winter, with the exception of the tips of the ears; (2) alpine form or 'Blue Hare,' grayish-brown in summer; (3) temperate form, grayish-brown both summer and winter, but somewhat whitish in the latter season. The Irish hare is probably this form.

Two species of hare have been recorded from India and central Asia, and one from the Cape. The American continent yields some dozen different forms, only one of which, however, occurs in the southern portion. Among these are the Polar Hare (L. glucialis), the Northern Hare (L. americanus), and L. aquaticus and L. padustris, the Swamp and Marsh Hares; these last are excellent swimmers and divers.

Fossil hares have been found in the Pliocene formations of France, the Post-Pliocene of North

America, and the caves of Brazil,
The Pikas belong to the genns Lagomys (sometimes made the type of a distinct family, Lagomyidae), which is distinguished from Lepus by its short hind-legs, very short tail, and rounded ears, as well as by the presence of complete collar bones.

The type species L. alpinus somewhat resembles a Guinca pig in shape and size; the colour is reddish-yellow sprinkled with black above, redder on the sides and front of the neck, paler below. It continually emits a penetrating whistle, repeated two or three times in succession, which has been compared to the note of a woodpecker. It inhabits langows in the ground which it excavates for itself, and in which it stores up food for the winter. Its habits are noctumal. There are eleven different species, which extend from Kamchatka along the chain of mountains in the centre of Asia, just entering Emope in the neighbourhood of the Volga. In America they are confined to certain parts of the Rocky Mountains. Fossil forms have been found in the south of Europe.—For the use of hare-skins, see Funs.

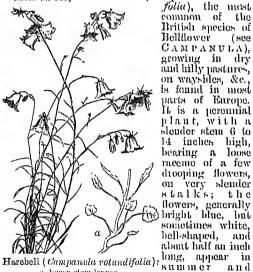
Hare, Julius Charles, one of the chief early leaders of the Broad Church party, was horn near Vicenca, in Italy, September 13, 1795. He spent part of his boyhood in Germany, and after his return was sent to the Charterhouse, from which in 1812 he passed to Triuity College, Cambridge. Here he was elected to a fellowship in 1818, and afterwards became classical lecturer. He tried the afterwards became classical lecturer. He tried the study of law, but soon abandoned it, took orders in 1826, and succeeded his nucle in the rich family living of Hnistuoneeux, Sussex, in 1832. He gathered round him a fine library of 12,000 volumes, and numbered among his friends Landor, Maurice, Bunsen, and others of the greatest spiritual teachers of his time. He had John Sterling as his curate (1834-35), and married in 1844 Jane E. Maurice, sister of Frederick Maurice. He became Archdeacon of Lewes in 1840, in 1853 chaplain to the Queen, and died January 23, 1855. His annual charges are among the most important sources for a talking of the colonia tital currency is of his a study of the ecclesiastical controversies of his Another great service that he did was to awaken Englishmen to the fact that they had much to learn in theology from Germany. His style is embrous, and his books gain nothing from their orthographical peculiarities. Already in 1820 he had translated Fonque's Sintram, when in 1827 he published anonymously Guesses at Truth, written in published anonymously traceses at Irith, written in conjunction with his brother Augustus. His next work was the translation of Niebuhr's History of Rome (1828-32) in collaboration with Thirlwall, and his own Vindication of Niebuhr's History (1829). His most important contributions to theology are The Victory of Faith (1840) and The Mussion of the Comforter (1846), two series of elaborate sermons preached at Cambridge. In 1848 he added the Remains of John Sterking, with a elaborate serinons preached at Cambridge. In 1848 he edited the Remains of John Sterling, with a life, a shong sense of the inadequacy of which inspired Carlyle's masterpiece. Other books are Parish Sermons (2 vols. 1841-49) and a Vindication of Luther against his Recent English Assailants (1854). See his nephew's Memorials of a Quiet Life.—His elder but less important brother, Augustus William Hare, was born in 1792,

and educated at Winchester and New College, Oxford, where he became a Fellow in due course. He was appointed in 1829 to the retired living of Alton Barnes, in Wiltshire, married in 1829 the gifted Maria Leycester (1798–1870), and died prematurely at Rome in 1832. Besides his share in the Guesses at Truth, he left lifty-six sermons to be published in two volumes in 1835.—Augustus John Cuthberf Hare, nephew of the two preceding, was born at Rome in 1834, and was educated at Harrow and at University College. Oxford. He has written a series of good descriptive books revealing fine artistic taste and wide knowledge of history and antiquities. Amongst these tedge of instory and antiquities. Antonigst tress are Walks in Rome (1871), Wanderings in Spain (1873), Days near Rome (1875), Cities of Northern and Central Italy (1876), Walks in London (1878), Cities of Southern Italy and Sicily (1883), &c. Other works are his delightful biography of Maria Hare, Memorials of a Quiet Life (2 vols. 1872; a supplementary vol. in 1876), and Life and Letters of Frances, Baroness Bunsen (1879).

Hare, Robert, scientist, was born in Philadelphia, 17th January 1781, and filled the chair of Chemistry in the University of Pennsylvania there from 1818 to 1847. He died 15th May 1858. In 1801 Hare described his discovery of the oxyhydragen blownipe (see BLOWPIPE). In 1816 he invented gen blawqipe (see Blowpipe). In 1816 he invented the calorimotor, a galvanic apparatus capable of producing intense heat; in 1823, with an improved form of this, called the deflagrator, Professor Silliman succeeded not only in fusing lut in valutilising earhon. Have also dovised improved forms of the voltaic pile. In his later years he lectured in advocacy of spiritualism; and, in addition to numerous papers and some works on chemistry, he published Spiritualism scientifically demonstrated (New York, 1855).

Hare and Hounds. See ATHLETIC SPORTS.

Harebell, or Bluebell (Campanula rotundi-



a, lower stem-leaves.

սունսույ, The juice of the flowers yields a fine blue colour, and may be used as ink.

Hareld (*Harelda*), a genus of the duck family (Anatide, see Duck), having a short thick bill, and two feathers of the middle of the tail, in the males, greatly clongated. Two species are known; the hest known, the Long-tailed Duck or Hareld (H. glacialis), inhalits the arctic regions both of the Old and New Worlds, its winter migrations in America extending as far south as the Carolinas.

Harclip is the name applied (from its resemblance to the lip of the hare) to a congenital noteh or cleft in the upper human lip, due to impernotes of deep in the appearance in the appearance in processes whose formation and fusion separate the mouth from the cavity of the nose. The eleft is not in the middle line, however, as in the bare; but a little to one side (single harelip), or there are two clefts, one on each side (double harelip). deformity, especially when double, is often associated with a similar defect in the roof of the mouth determine a similar detect in the root of the mouth (cleft palate). The cause of these arrests of development is quite unknown. Harelip is not at all dangerous, but very unsightly. It can be remedied by a surgical operation, which most surgeous prefer to perform during infancy.

Harem (Arab. El-Harim, 'the inviolable') is that part of a polygamist's house which is set apart for the use of his wives and their attendants; it also denotes this collective body of women. In all Mohammedan countries it is customary for wealthy men to keep a harem; for, though four is the number of wives to which the faithful are restricted by the Koran, there is no limit to the number of concubines a man may have except his ability to maintain them. The mention of a haren naturally suggests to most people the female portion of the royal households of Turkey and Persia and Egypt. In the sultan's harem each wife-he alone may have seven-has a separate suite of apartments and a separate troop of female slaves to wait upon her and do her bidding. All the female slaves or and do her bidding. All the female slaves or odalisques throughout the harem are, however, at the disposal of their royal master. Sho who first gives birth to an heir, whether wife or slave, is instantly promoted to the rank of chief wife. The title sultana is borne, not by the sultan's wire, but by his mather, sisters, and daughters. The real ruler of the harem is the sultan's mother, but under her is the lady-superintendent of the harem, usually an old and trusted favourite of the sultan. The duties of guarding the harem or scraglic (Ital. from Latin sera, 'a bar;' cf. Turkish and Persian serai or saray), as it is sometimes called, are entrusted to a small army of cunnels, the chief entristed to a small army of cunnels, the ener officer of whom generally enjoys considerable political influence. The immates of the luren lead a very secluded life. They are not allowed to be seen by men, except their nearest relatives, as father and brother. Their principal occupations are needlework, spinning, and embroidery, which are relieved by the 'enit' of the toilette, and such appropriate the advances of the context of the context. amusements as dancing, singing, and games. On the death of the sultan those women who have borne daughters to him are at liberty to leave the tharen and marry again; the nothers of princes are transferred to the 'old senglia,' and kept there until they die. In the harens of the great men of Turkey and Egypt a good deal of modern European luxury has been introduced of late years, and the ladies now dress themselves in accordance with fashions derived from Paris or London,

The institution is not, however, confined to Mohammedan countries, but flourishes also, or did flourish, in some form or other, amongst the Jews, Bahylonians, ancient Persians, Siamese, &c. In Bangkok, tho capital of Siam, the harem of the king forms a walled city within the larger city, so extensive is it.

The holy cities of Mecea and Medina are to-gether called the harems or the sacred places, and the sacred mosque at Meeea is designated the mesjid el-harim or 'the inviolable mosque.'

During the 18th and 19th centuries the interiors of oriental harems have been entered and the lives of their inmates studied by several European and American ladies, as those of Constantinople by Lady Mary Wortley Montagu in 1716; those of Cairo and Damaseus by Harriet Martiuean in 1847; that of the Khedive at Cairo by two ladies of Mr W. H. Seward's American party in 1871; some in Turkey by another American lady, Mrs Caroline Paine; and the royal harem at Bangkok by yet another lady from the United States, Mrs Leonowers. For harem life in India, see ZENANA.

Hare's-ear (Buplcurum), a genus of plants of the order Umbelliferac, having compound umbels of yellow flowers, and generally simple leaves. The leaves of the most common British species, B. rotundifolium, are perfoliate. This plant, which grows in cornfields in the chalk districts, is the Thorough-wax of the old herbalists. The species of hare's-ear are unmerous, and are natives of temperate climates in most parts of the world.

Harfleur (called in the middle ages Hareflot), a town in the French department of Seine-Inferienre, is situated on the estuary of the Seine, 4 miles E. of Havre. Formerly Harfleur was an important seaport and maritime fortress, but the rise of Havre, coupled with the sanding up of its harbour, led to its deeay. Pop. 2317. It was taken after a six weeks siege by the English under Henry V. in 1415, and during the next twenty-five years changed hands three times. It was pillaged by the Hugnenots in 1562.

Hargraves, Edmund Hammond, the discoverer of the goldfields of Australia, was born at Gosport, in England, in 1815. When eighteen years of age he settled in Australia. Attracted to California in 1849, he there tried his luck as a gold-digger, and whilst so engaged was greatly struck by the similarity in the geological formation of California and Australia, and suspected that gold would be found in the latter. On his return home he proved the correctness of his surmise by discovering gold on the western slopes of the Blue Hills in New South Wales in 1851. He was appointed commissioner of crown-lands, and received from the government of New South Wales a reward of £10,000. In 1855, one year after his return to England, he published Australia and its Goldfields.

Hargreaves, James, the inventor of the spinning-jenny, used in the manufacture of cotton, was an illiterate weaver and carpenter of Standhill, near Blackburn, in Lancashire, where he was horn. In 1760 he helped Robert Peel (the founder of that family) in the construction of a carding-machine; and half-a-dozen years later he invented the spinning-jenny, the idea of which is said to have been suggested to him by seeing a spinning-wheel, which one of his children had upset, continue to revolve horizontally, whilst the spindle revolved vertically. But his fellow-spinners, imbued with strong prejudices against machinery, broke into his house and destroyed his frame. He then removed to Nottingham (1767), where he creeted a spinning-mill. Three years later he took ont a patent for his invention; but, as it was proved that he had sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated. Hargreaves continued to earry on business as a yarn manufacturer till his death on 22d April 1778, when his share in the mill was hought by his partner for £400. See Francis Espinasse's Lancashire Worthics (1874).

Haricot. See BEAN.

Hari-kari (rather hara-kiri, 'belly-cut,' also ealled 'happy despatch'), a term applied to the curious Japanese system of official suicide, obsolete since 1868 (see Japan). The Japanese estimated the number of such snieides at 500 per annum. All military men, and persons holding civil offices

under the government, were held bound, when they had committed an offence, to disembowel themselves. This they performed in a solenn and dignified manner, in presence of officials and other witnesses, by one or two gashes with a short sharp sword or dagger 9½ inches long. Personal honour having been saved by the self-inflicted wound, the execution was completed by a superior executioner (or rather the victim's second, often a kinsman or friend of gentleman's rank), who gave the coup de grâce by beheading the victim with one swinging blow from a long sword. Japanese gentlemen were trained to regard the hara-kiri as an honourable expiation of crime or blotting out of disgrace. See articles by an eye-witness in Cornhill (1869).

Häring, Georg Wilhelm Heinrich, better known under the name of Wilheld Alexis, a German novelist, was born at Breslau, 23d June 1797. He at first studied law at Berlin and Breslau, but abandoned this pursuit for a literary career. His first success as a writer was the historical romance Walladmor (1823-24), published as a work by Sir Walter Scott, a fraud that found belief and led to the book being translated into several languages (into English, very freely, by De Quincey, 1824). This was followed by Die Geachteten (1825) and Schloss Aradon (1827). Hating's subsequent historical romances, the clerer character-drawing, historical verisimilitude, and vigorous description of which entitle them to a high rank, are Cabanis (6 vols. 1832), Roland von Berlin (3 vols. 1840), Der flakele Woldemar (3 vols. 1842), Hans Jurgen und Hans Jochem (2 vols. 1846), Der Warveolf (3 vols. 1848), Ruhe ist die erste Burgerpflicht (5 vols. 1854), Lecgrimm (3 vols. 1854), and Dorothe (3 vols. 1856). Besides these, he wrote books of trarel, sketches, dramas, and other works. His Gesammelte Werke were published at Berlin in 20 vols. in 1874, the historical romances as Vaterlindische Romane in 8 vols. in 1884. He died 16th December 1871.

Marington. See HARRINGTON.

Hariri. ABU MOHAMMED AL KASIMIBN ALI, surnamed AL-HARIRI ('the Silk-merchant'), an Arabic writer, was born at Basra, on the Tigris, in 446 A.H. (1054 A.D.), spent his life in study and devotion to literary work, and died at Basra about 1121. He wrote valuable works on Arabic grammar, as Molhut el Irab, a work on syntax, and Durrat el-Ghawwas, on common faults in entrent language. But the most famous of his writings, indeed one of the most famous compositions of all times and countries, is his Makamat (Literary Gatherings). This is a collection of rhymed tales, the central character in which is a certain Abu Seid from Sernj, a witty, clever, amiable rogue, well read in sacred and profane lore, but ennning and unsempulous, who turns up under all possible dis-gnises and in all possible places. The brilliancy of imagination and wit displayed in these adventures, their striking changes, and dramatic situations, have hardly ever been equalled; but more wonderful still is the poet's power of language. The whole force of the proverbial fullness of expression, spirit, elegance, and grandeur of the Arabic idiom has been brought to bear on the subject. Indeed, as far as language is concerned, the Makamat is looked upon in the East as the highest source of anthority next to the Koran. The hook has been translated, either entirely or partially, into nearly every Eastern and European tongue, and has been the prototype of innunerable imitations, the most successful being one in Hebrew, Machberoth Ithiel, by Yehudah ben Shelomoh al-Kharizi. The best Yehudah ben Shelomoh al-Kharizi. The best edition of the Makamat is that by Silvestre de Sacy, which appeared in Paris, 1822 (re-edited 1847-53). Of translations, the palm is due to Rückert, who

has completely reproduced the spirit and form of the work in his *Verwandlungen des Abn Scid ron* Scrug, first published in 1826. English translations (partial) have been made by Preston (1850) and hy Chenery (1867).

Hari-Rud, or Heri-Rud, a river of Asia, which rises in the Hindh Kush about 150 miles W. from Kabnl, pursues a western course through Afghanistan for nearly 250 miles; then, bending suddenly to the northward, it forms the boundary between Persia and Turkestan, and, after a further course of about 250 miles, loses itself in several arms in the Tekke Turkoman oasis.

Harivansa, a Sanskrit epos, which professes to be part of the Mahabharata, but may be more properly classed with the Parônas (q.v.).

Harlamoff, Alexis, a Russian artist, born at Saratoff in 1844, studied at St Petersburg Academy of Fine Arts, gained several medals, hecame a member of the Academy in 1869, and soon afterwards settled in Paris. A regular contributor to the Salon, his portraits and pictures of children and young girk, excented with feeling and painstaking care, have rendered him famous. See R. Walkers article in thou Words (1889).

Harlaw', 18 miles NW. of Aberdeen, the site of a battle fought on 24th July 1411, between the Highlanders led by Donald, Lord of the Islos, and the Lowlanders of Mar, Garioch, Bucham, Angus, and Mearus, under Alexander Stewart, Earl of Mar. The battle was long and bloody, but the Highlanders were at last driven back, leaving more than 900 dead upon the field. For long after 'the red Harlaw' was a favourite theme of legend and song.

Harlech, an ancient town of Morionethshire, North Wales, stands on the coast, 10 miles N. of Barmonth. On a steep hill overlooking the sea is its massive eastle, which held out for the Lamentrians in the Wars of the Roses, and later for Charles I. The 'March of the Men of Harlech' commemorates its capture by the Yorkists in 1468. For the Harlech series, see Cambraan System.

Harlequin. See Pantomine. The etymology of the word is enrious. The Fr. is arlequin, from which apparently is derived the Ital. arleachine. The Old Fr. phrase, was li maisnic hierlehin (Low Lat. harlequini familias), 'a troop of demons that haunted lauely places.' This Skeat derives from Old Fries, helle cyn, Icel. heljar kyn--i.e. the kindred of hell, host of hell, troop of demons. The change from hellequin to harlequin was due to a noistaken analogy with Charles Quint. See Max Muller's Lectures, ii. p. 581.

Harlequin Duck (Anas for Changula) histrionica), a species of Garrot which recoives its name from its variegated markings, white, gray, black, and brown. It inhabits the seashore and its inlets and river mouths, being seldom seem inland. It is found in Kamehatka and Greenland, on the shores of the Caspian Sea, Sea of Aral, and Lake Baikal. In America it is found in Labrador, Hudson Bay, Newfoundland, and Bay of Fundy, and advances in winter southwards to the United States. Its whole length is about 17 inches. See Wild-duck.

Harless, Gottlob Christoph Adolf von, a German Lutheran theologian, was born at Nuremberg in 1806, and was professor of Theology at Erlangen from 1836, and at Leipzig from 1845. In 1850 he became chief court preacher at Dresden, and exercised great influence on ecclesiastical affairs in Saxony. In 1852 he was appointed president of the Protestant consistory at Munich, and succeeded in making the Lutheran Church in Bavaria strongly orthodox. He died 5th Soptember 1879. His most important works were his Theologische

Encyklopadie und Methodologie (1837) and Die christliche Ethik (1842; Eng. trans. 1868). His autolography appeared as Bruchstucke aus dem Leben eines Suddeutschen Theologen (1873-75).

Harley, Robert, Earl of Oxford and Mortimer, the son of Sir Edward Harley, an active partisan of the Parliament during the civil was, was born in London, 5th December 1661. The politics of the family were Whig, and as such Robert Harley entered parliament for the Cornish borough of Tregony. But at the end of his first parliament he was elected for New Radnor, and this constituency he continued to represent until 1711. He soon acquired a great reputation for his in the parliament which met under the chieftain-ship of Rochester and Goddlphin, in February 1701, he was elected speaker. This post he retained until 1705, though in April 1704 he became also Scenetary of State. But shortly after this time Harley began to influence the queen's mind against the party of Marlhorough and Godolphin; for, apparently from motives of personal ambition, he now began to intrigue with and for the Tories, and he found a most useful ally in his consin, Abigail Hill (Mrs Masham). Godolphin failed not to detect what was going forward, and in February 1708 the conviction of Harley's secretary for treasonable correspondence with France caused his master to resign office. The discarded minister then set to work, aided by his consin, to undermine the power of the Whigs, and in August 1710 (Jodolphin was dismissed, Harley being appointed than the of the Erderchart and the construction of the Charles and the Charles and the construction of the Charles and the construction of the Charles and the Charl Chancellor of the Exchequer and made head of the government. In 1711 occurred an event which raised Harley to the aeme of popularity. A French priest and spy, who assumed the title of Marquis de Uniscard, being brought before the council on the of Marquis and the other of the other the 8th of March on the charge of treasonable correspondence with France, suddenly stabled Harley in the ligenst with a penknife. His life was said in the meast with a penkinte. His hie was said to have been in danger, but he recovered, and was created Earl of Oxford and Mortimer, made a knight of the Garten, and in May appointed Lord High Treasurer of Great Britain. He was the last to hear this title; henceforth the chief adviser of the sovereign was known as the first minister to the crown, or the prime-minister. The principal Utrecht, the opposition of the Whig majerity in the Upper House being overcome by the oreation of twelve new peers. But Oxford's popularity was already on the wane; the friendship between him and Bolingbroke had degenerated into bitter jealonsy, and was fast turning to hatred, and Mis Masham sided with Bolingbroke. Moreover, Oxford estranged the Jacobites by his irresolution and want of a decided policy. On 27th July 1714 he was dismissed from office, his successor being Boling. broke. Five days later, lowever, the queen died, and George I. was proclaimed king. In July of the following year Oxford was impeached and sent to the Tower, but after two years' imprisonment was acquitted by the Peers, and released. He spent the remainder of his life in retirement, the friend of scholars and use of letters, especially of Swift, and the founder of the Harleian collection of books and MSS, in the British Museum (q.v.). The Harleian Society, named from him, was founded in 1869 for the publication of heraldic visitations, &c. He died May 21, 1724. Harloy was not a great statesman; the fault that marred his career was indecision of purpose, a desire to stand well with all parties. He followed no decided policy, but intrigued all round, not only with Whigs and with Tories, but also with the enemies of his country. Consequently he was distristed by all parties and loved by none.

Harlingen (Frisian Harns), a seaport of the Netherlands, in the province of Friesland, on the Zuider Zee, 14 miles W. by S. from Leeuwarden. It has a good harbonr (1875), protected from the sea by dykes. The manufacture of linen sacks and machines and shipbuilding are the chief industries. Batter and cattle are exported to England. Pop. 10,274.

Harmalin is a vegetable base, and Harmin another, both of which occur in the husk of the seeds of Peganum harmala, or Syrian rue, a zygophyllaccous, shrubby plant that grows abundantly in the steppes of southern Russia. The seeds have been used in dyeing silk, to which they impart various shades of red.

Harmattan, a hot desiccating wind, prevalent on the Gninea coast during December, January, and February, which blows from the interior to the Atlantic Ocean. It is generally preceded by clouds of extremely fine sand, called 'smokes' or 'fog,' which penetrates everywhere and covers everything. It has a hurtful effect on vegetation, and on the human body, drying up the eyes, nostrils, and mouth, and even causing the skin to peel off. The negroes protect themselves against it by rubbing the body with fat or grease. It has, however, the good effect of checking epidemics, and curing dysentery, fevers, and cutaneous diseases. The harmattan is similar to the Sirocco (q.v.) of Italy.

Harmodius and Aristogeiton, two Athenians strongly attached to each other, who in 514 B.C. murdeted Hipparchus, the younger brother of the 'tyrant' Hippias, partly on account of an insult offered by him to the sister of Harmodius, and partly with a view to the overthrow of the Pisistratide. They meant to kill Hippias also, but Harmodius was cut down by the bodyguard of Hipparchus, whilst Aristogeiton fled, but was afterwards taken and executed. Subsequently they came to be regarded as patriotic martyrs, and received divine honours from the Athenians, and had statues raised to their memory. A beautiful drinking-song by Callistratus celebrates their deed.

Harmonica, a musical instrument, invented in 1760 by Benjamin Franklin, the sounds of which were produced from bell-shaped glasses, placed on a framework that revolved on its centre, while the rims were touched by the moistened finger. An instrument of the kiud was used at Nuremberg in the 17th century. In 1746 the great composer Gluck, and in 1750 an Irishman named Puckeridge, played in London airs on a low of glasses, tuned by putting water into each. When Franklin finished is invention, in which the pitch was regulated by the size of the glasses alone, he found an excellent performer in Miss Marianne Davies, to whom he made a present of his harmonica, and who during 1762-73 performed on it with great effect in London, Paris, Vienna, Milan, Naples, &c. This fascinating instrument found many admirers, but none of them ever succeeded in improving it. The production of the sound by the points of the fingers caused such an effect ou the nerves of the performer as in some instances to induce fainting lits. All attempts to make the harmonica easier for amateurs through means of keys ended in failure, since no substance was found to act as a substitute for the human finger. The harmonica gave rise to a host of similar instruments by Chladni, Kaufmann, and others, which were not particularly successful. Other instruments of no merit or importance took the same or a similar name, but had not the most remote resemblance to the original—e.g. steel pegs or strings being substituted for the glasses (see HARMONICON). The original harmonica, for which 244

Mozart and Beethoven composed, was the instrument popularly known as musical-glasses. See Pohl, Zar Geschichte der Glasharmonica (1862).

Harmonica, CHEMICAL. This term is applied to the musical note which is evolved when a long dry tube, open at both ends, is held over a jet of burning hydrogen. A rapid current is produced through the tube, which occasions a flickering, and is attended by a series of small explosions, that succeed each other so rapidly and at such regular intervals as to give rise to a musical note, whose pitch and quality vary with the length, thickness, and diameter of the tube. See Flame.

Harmonic Engine, an invention of Edison's, in which the energy of an electric current is used, by means of two small electromagnets, to keep up the vibrations of a large and heavily weighted tuning-fork. The arms of the tuning-fork are connected with two pistons which work a miniature pump, and this may compress air, which, in its turn, can drive sewing-machines or do other light work.

Harmonicon, a musical instrument consisting of glass or metal plates supported on strings at points about one-fourth of the length from the free ends. The plates are struck by soft hammers and enter into transversal vibrations, the frequency of which varies directly as the thickness, inversely as the square of the length, directly as the square root of the elasticity of the vibrating material, and inversely as the square root of its density. The points of support become nodal points.

Harmonic Proportion. Three numbers are said to be in harmonic proportion when the first is to the third as the difference between the first and second is to the difference between the second and third; otherwise, harmonic proportion is that which subsists between the recipiocals of numbers which are in anithmetical proportion. Thus, 3, 5, 7, &c., being in arithmetical proportion, \(\frac{1}{2}, \frac{1}{2}, \frac{1}{2

AB is said to be harmonically divided when two points are taken, one in the line and the other in the line produced, as C and D, such that AC: CB::AD::DB. When the line is thus divided, AD, CD, and BD are in harmonic proportion. A harmonic progression is a series of numbers in harmonic proportion, as the series formed by the reciprocals of numbers forming an arithmetical series.

Harmonics. Every musical sound, although to the instrained ear it appears to be single, will, on close observation, be perceived to consist of a principal or fundamental tone accompanied by higher tones or harmonics which blend and generally harmonise with it. The existence of such harmonics (or partial tones) may be perceived on loudly sounding a low note on a pianoforte with the loud pedal held down: as the sound dies away the harmonics become more and more prominently audible, especially when they are singly listened for one after the other; and the more tinkling the quality of tone of the instrument the more readily they are heard. In fact, in a tinkling pianoforte they are at all times louder than the fundamental tone, though they are masked by it, as all high tones appear to the ear to be masked by lower tones; and the tinkling quality is due to their presence. The peculiar recognisable character of all sounds—different voices, pianoforte, organ, violin, &c.—is due to the presence of harmonics, each with its own intensity; and by sounding along with a simple fundamental sound a number of harmonic tones, each with varying degrees of loudness, an

endless range of quality may be conferred upon the fundamental tone.

For demonstration of harmonies in sounds of all kinds a series of resonators is necessary. When a tuning-fork is vibrated near a hollow vessel of suitable capacity (say a lamp-elnimney sunk in water to an adjusted depth), the air within the hollow vessel vibrates in unison with the fork and emits a loud sound; similarly, when the capacity of such a resonator corresponds to the pitch of a harmonic tone present in a given sound, the resonator sounds ont that harmonic. By a series of such observations all the harmonics can thus be severally recognised. The physical basis of harmonic tones is the fact that no vibration of an elastic body is ever accomplished without a more or less well-marked division of the vibrating body into segments which vibrate independently and simultaneously. To realise this, take a long string stretched between two points; set it in vibration by means of a violin-bow; the cord will appear to

vibrate as a whole. Now, by means of the fingernail or of a stretched thread lightly pressed upon it at the exact mid-point, 'stop' the mid-point and again bow; the string will appear to vibrate in two independent halves or loops, with a node or point of rest between them; the vibrations will be twice as frequent as at first, and the sound produced will be the octave of that originally heard. Again, stop a point one-third of the length from either end and again set in vibration; two nodes and three loops will be formed; the vibrations will be the twelfth above the original fundamental. In the same way, any point entting off one aliquot part of the string may be stopped; the string will spontaneously form the corresponding number of nodes and loops when set, in any fashion, into vibration. If we suppose the original sound to have been C₁ on the second ledger line below the bass staff, the various sounds produced by treating the string in this way will respectively be:



The notes marked with asterisks are not notes of the natural scale; 7 and 14 are a flat Bb often to be heard in the sound of chime-bells; 11 is nearer Fithan Fi; 13 is nearer to A than it is to Gi. Now, in a vibrating string all these vibrations co-exist; to what degree any one shall be present depends on the way in which, or the point at which, the string

is bowed or struck or plucked; and the quality of the resultant note varies accordingly. From the harmonies the true ratios of the members of the diatonic seale may be found—e.g. b' has a frequency of vibration 15 times as great as that of C₁; whence B₁ has a frequency J₈ times as great; and so for the test, as follows:

Notes of the seale of C	\mathbf{C}	D	\mathbf{E}	\mathbf{F}	G	A	В	C
Notes of any diatonie seale in general	d	r	111	f	R	1	Ĺ	ď
Ratios	1	я. 8	ą	4.	3	5	1,6	2

For the modification in these ratios introduced by the system of temperament, see Temperament. The standard work on Harmonics is Helmholtz's Sensations of Tone (trans. by Mr Ellis; 2d ed. 1885).

Harmonists. See RAPP.

Harmonium, a musical instrument, for the invention of which many claims have been advanced. The arrangement by which the sounds of the harmonium are produced is called the free vibrating reed, supposed to have been a modern discovery, but now ascertained to have been known in China long before it was ever heard of in Europe. Its construction is as follows: A narrow rectangular slit being made in a piece of brass-plate of a quarter of an inch in thickness, a thin elastic spring of the same metal, and of nearly the exact breadth of the slit, is fixed at one end by two small rivets to the surface of the plate, close to one end of the slit, and, when pressed into it at the free end, can pass inwards without touching the end or the sides of the slit, and when left to itself it can return back to its position of covering the slit. The spring at the free end is permanently bent a very little outwards. When a current of air is forced through the slit, the spring is put into vibration, and produces a continuous musical sound, acute or grave, according to the rapidity or slowness of the vibrations. This kind of reed is termed 'free,' in

contradistinction to the reed of the organ-pipe, the spring or tongue of which entirely covers an oblong slit, in the side of a brass tube closed at one end, and vibrates against the cheeks or outside of the slit, instead of within it.

After many attempts, in various countries, to construct a keyed instrument of really a useful kind with the free reed, Debain of Paris produced his invention (1840) of the harmonium, which became more or less the model of all the others that have followed. The harmonium occupies comparatively little space, being only about 3 feet 3 inches high and 4 feet broad, the depth being according to the number of the stops, usually from 20 to 23 inches. It has a compass of five octaves of keys from C to C, the key-board being placed on the top, immediately below the lid. Under the key-board is the bellows-board, in which are valves for each key; while above the valves are the different rows of reeds. The sizes of the reeds differ, according to pitch, from about 3½ inches long to ½ inch; and the quality of sound is affected and modified by the breadth of the vibrating part of the reed, and the shape of the aperture in the bellows-board covered by the valve. The pressure of wind is from a bellows with two feeders, which the player moves alternately with his feet, filling a reservoir, similar to the bellows of a small organ. When a key is pressed down, the valve opens, and the wind, which has access from

the bellows to the wind-chest, rushes through the slit of the reed, and produces a sound which continues as long as the valve is kept open. It is a peculiarity of the free reed that an increase or a diminution of the pressure of wind does not alter the pitch of the sound, but merely increases or diminishes its volume. Advantage may be taken of this peculiarity by the harmonium-player to effect a crescendo or diminuendo by gradually angmenting or decreasing the pressure of the wind. The vibrations of the spring being like those of a pendulum, isochronous, remain fixed in rapidity or slowness, according to the length and elasticity of the vibrating slip of metal, and thus regulate the pitch of the sound without reference to the pressure of wind. For the deep bass-notes the springs are heavily loaded at the loose end, to make them vibrate slowly; while in the higher notes they are made thinner at that end.

Harmoniums are made of various sizes, and from one row of reeds (or vibrators, as they are now called) to four or more rows. Each row is divided near the middle, between an E and F; and each half has its separate drawstop. Knee-pedals are sometimes added for producing the same modifications of tone as the swell on the organ. Some harmoniums are made with on the organ. Some manioning a greater variety in playing solo with an accompaniment; and for more skilful performers, pedals for the feet, similar to organ-pedals, are attached. The manifacture of the harmonium in Paris has, of late years, increased almost incredibly. The various parts of the harmonium can be obtained there ready-made, from a single real to a complete set. The best the harmonium can be obtained there reany-mane, from a single reed to a complete set. The best-known makers are the Alexandres and Mustel in France, and Bauer in England. The Scraphine France, and Bauer in England. The Seraphine was a similar but much inferior instituent. The American Organ, introduced in 1861 by Messis Mason & Hamlin, is a kind of harmonium which acts by wind exhaustion or suction, and instead of force bellows, works by exhaustion bellows. Its tone is softer, and its timbre less reedy; it is also easier to play. But the true harmonium is capable of higher treatment. The percussion action for the harmonium is due to a small harmonium is that of harmonium is due to a small hammer like that of a pianoforte, which strikes a blow on the vibrator the moment the key is pressed down, and sets it instantly into vibration, thus assisting the action of the wind. The *capression* stop—an invention of the Alexandres, father and son—is used almost continuously by the best players on the instrument, but is very difficult to manners. By the action of but is very difficult to manage. By the action of this stop, the air-reservoir is cut off, and the pressure becomes entirely dependent on the management of the bellows. The latest invention of importance is the melody-attachment of Dawes—the date of the patent was 1864—which gives predominance to any special note or notes in the upper part of the harmony, by a contrivance which shuts off all notes except the highest, in certain registers of a combination. Harmoniums may now be had of various sizes and qualities, at prices from £5 to of various sizes and quamies, at prices from 25 to £120. Valuable for accompanying psalmody, they suitably take the place of organs in temporary places of public worship, or among the less opnient class of eongregations; but of late years the French school of players, headed by M. Lemmens, have true tell the Lemmens, have treated the harmonium with success as a brilliant solo instrument. For domestic use, harmoniums are not likely to supersede the pianoforte; but possessing the important advantage of not going ont of tune through humidity of atmosphere, they will be found available in climates where pianos cannot properly be kept.

Harmony, paradoxical as it may seem to the lay mind, is the science of discord. It treats of the laws which control the relationship of one chord or

set of chords to others, and which decide the relation to the fundamental concord of the dissonant elements in a discord.

Concords.—A chord or combination of several tones in any scale or key may be a concord or a discord. The one concord in a key consists of the tonic or keynote and the notes which are respectively a major third and a fifth above the keynote:

* and † are respectively the first and second 'inversions' of the chord. These three are the notes which nature gives us as producing a perfect sound in combination (see Harmonics); they are therefore called 'consonances,' and any foreign element is a 'dissonance.' This 'common chord' or 'triad' makes a starting-point and a point of finality from which the harmonies proceed, nound which they rally from time to time, and into which finally they resolve themselves. It is with few exceptions the first and invariably the last chord in any composition. One dissonance suffices to change a concord to a discord, which can be effected by adding to the notes of this common chord, or by changing their relationship to each other, &c.; and the fundamental law of harmony is that discord as an incomplete idea unust give place to concord before the ear can be satisfied. This process is called 'resolving' the discord. Thus concords stand firm like the straight lines or outstanding features in a landscape; while discords supply the curved lines of beauty, the effects of perspective, and the variety which gives interest to the picture.

Discords.—The seventh harmonic of nature which is a minor seventh distant from the root—i.e. one semitone less than the seventh consecutive note in an ascending major scale—produces a discord which, with its complementary or fulfilling concord, is the foundation of all harmony. This discord is called the DOMINANT SEVENTH (its sign is V₇.), and its 'resolution' is the triad of the key to which it belongs—i.e. the chood of the tonic (I.).



A is an example of 'close,' B of 'open' or 'extended' harmony. Because the discord on G seems thus to demand the chord of C as its resolution, the note G (or similarly the fifth degree in any scale) is ealled the dominant (V.) of that key, and the chords and discords built on it constitute the dominant harmonies. Position B is the most satisfactory to the ear, because of the effect of finality induced by the resolution to the first position of the triad; and the two chords together form the dominant or authentic cadence—the most important of those terminal phrases which serve in music much the same end as commas, semicolons, and periods in composition. 'God save the Queen' offers examples of two other important cadences, showing at the same time how these mark the completion of more or less final musical periods.

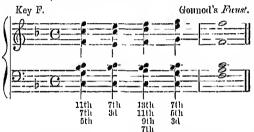


The first period is closed at A by a 'half' or 'imperfect' cadence—i.e. the order V.—I. is reversed; the second at B by a 'false' or 'decentive' cadence—i.e. the dominant chord, instead of proceeding to the tonic, 'deceives' the car by proceeding to another chord; the third period is hrought to a close by the authentic cadence at C.

to a close by the authentic cadence at C.

The dominant chord can also hear the more elaborate dissonances of the ninth, eleventh, and

thirteenth, as well as the seventh.



It is impossible here to enter into the varieties of discord—'snspensious,' 'double-root chords,' &c., into the analogous discords which may be built on the tonie as a ground-note, or the chords helmging to the minor scale. Suffice it to say the effects which can be evolved from the almost innumerable inversions and involutions of single chords and combinations of chords are subject to natural laws as stringent as those governing the growth of flowers and trees, and the possibilities of variety in this unity are as infinite.

Modulation. - One branch of the subject can

handly be left without mention—i.e. modulation of change from one key (or 'mode') to another. Our modern scales have had the relation of their intervals so modified (see Temperament) as to be approximately alike. By the addition of a single sharp or flat any melody can proceed from the key of C to G (with F#), F (with Bb), or A minor (with G#). These—the dominant, subdominant (next below the dominant), and the minor of the sixth degree—are the keys of the first relation, as ont of the seven notes which constitute each scale six are present in the scale of C, thus providing as it were six more or less convenient bridges by which to pass from one key to the other. The conventionality of these modulations makes them inadequate to convey the more passionate colouring of modern umsic, and more striking changes to remoter keys are necessary. A favourite device with modern composers is to take advantage of the tempered' system, and by using one note in two significations (e.g. F × E#) to seeme means of startling and also of very tender effects in modulation. History.—The complete Greek scale as formulated by Pythagoras is represented by three octaves of our scale of A minor, beginning at the A in the first space of the bass clef, and using no black notes. Various sets of eight notes selected from this extensive scale were called after districts of Greece, and in the 4th century St Ambrose adopted four of these mames when he laid the foundation of modern music in what are called the Gregorian Modes. They received their name from Pape Gregory, who added four others beginning on the respective deminants, and called them plagul, as distinct from the authentic modes of St Ambrose. The



most important of these are

The Dorian and Æolian, and less frequently others even more at variance with our conventional scale, are still in occasional use; and peculiarly plaintive effects can be obtained from the absence of the 'sharp seventh' to which our modern cars are so accustomed.

In Counterpoint, the science which preceded harmony, attention was given altogether to the correct progression of the individual voices or parts, while the combinations made by the voices at any moment were regarded as merely accidental. But unconsciously the ear of unsicians was being cultivated, and the richness of Palestrina's simpler

writings must have shown the possibility of obtaining underent-of effects from chords as integral units in a march of harmonies, rather than accidental combinations of independent melodies. One of the fundamental rules of counterpoint was that a dissonance must either be 'prepared'—i.e. it must appear as a consonance in the previous chord—or else it must be approached very gradually. This rule of the old science was disregarded by Monteverde (1608), who used imprepared discords, and thus at one blow the new feeling for chords was released from its bondage to counterpoint.



The chords at * present the same discord—the eleventh and seventh on A, the dominant of D. The first is carefully prepared, and so has a smooth effect; the second is quite 'free' in its entry, and

has a sudden and startling effect.

Only one who understands counterpoint and harmony can appreciate the full importance of the new departure. It meant that discords were no longer mere variations of concords, but individual creations with an individual's rights and duties. The discord most easily used was the dominant seventh, the first discord produced by nature's harmonics; and so the relation of dominant to tonic—the central idea of all harmony—developed from an increasingly general tendency into a recognised rule. During the 17th century many experiments were made by Monteverde's followers, until at the end of the century Ramean's famous treatise called attention to the fact that all chords are derived from some note which is the generator or root, and the relationships of these roots govern the progressions of the harmonies. The less known, but hardly less important, researches of Tartini formed a good supplement to Ramean's theory; and the basis of scientific harmony established by these two works has not been seriously disturbed even by the thorough investigation and the astonishing discoveries of Helmholtz, who has extended the foundation and built a complete superstructure In the meantime, while theorists fought each other with great herceness just as their successors do to-day, the science made extraordinary progress under such practical harmonists as Bach, Mozart, and Beethoven. Bach's daring but merring feeling for harmony, his grasp of the mysteries of chord-relationship, and his unequalled skill in part-writing enabled him as early as the beginning of last century to transform an ordinary progression of simple choids into such a passage as



The accented dissonances (*), so smoothly introduced and yet so striking, are extremely effective. Haydn's work, and Mozart's also, is considerably softer; their use of discord proved insufficient for the expression of the great passion which is the feature of Becthoven's later work. The romanticism of Schumann required still freer scope, and Wagner, who handles any number of parts as easily as did Bach himself, has enlarged the possibilities of harmony so far that it is difficult to conceive of any further advance. Theoretical harmonists have followed fast in the train of these great composers, and, as system after system proved inadequate for the analysis of new harmonies or new uses of old harmonies, the revered names of each generation have been pushed aside more or less contemptuously by succeeding schools.

Among the most famous works on harmony are those by Rameau, Logier, and Dr Day; Richter's text-book—long used at Leipzig Conservatorium—is a very good example of last generation's guide; and it is England's proud boast to-day that the attempt to reconcile theory with practice is most successful among her musicians. Sir George Macfarren's Harmony is founded on Dr Day's system; Sir Frederick Ouseley's is even more scientific; and probably the most successful, as well as certainly the most readable of all, is Sir John Stainer's Theory of Harmony. Sir George Macfarren's six Lectures, dolivered at

the Royal Institution, give an exhaustive and popular account of the progress of harmony; and more technical readers will find much that is instructive in D1 Parry's brilliant article in Grove's Dictionary of Music.

Harmony of Gospels. See Gospels.

Harms, CLAUS, German divine (1778-1855), whose memorial work, Dus sind die 95 Theses oder Streitsutze Luthers (1817), in celebration of the tercentenary of the Reformation, produced a sensation in Germany.

Harnack, Theodosius, a Luther an theologian, was born at St Petersbing in 1817, and studied at Dorpat, where he was professor of Theology from 1848 to 1853, next till 1866 at Erlangen, and again at Dorpat till his retirement in 1873. He died in 1889. His principal works are his Praktische Theologic (3 vols. 1877–82) and Katechetik und Erllaring des kleinen Katechismus Luthers (2 vols. 1882).

—Of his sons, all of whom have attained to some distinction, the most famous is Adolf, who was born 7th May 1851 at Dorpat, where he studied from 1869 to 1872. He was appointed privat-docent for church history at Leipzig (1874), extra-ordinary professor there (1876), and ordinary professor successively at Giessen (1879), Marburg (1886), and Berlin (1888). His chief writings are Zur Quellenkritik der Geschichte des Gnosticismus (Leip. 1873); Die Zeit des Ignatius und die chronologie der antiochenischen Bischafe (Leip. 1878); Dus Monchtum, seine Ideale und Geschichte (2d ed. Giessen, 1882); Lehrbuch der Dogmengeschichte (2 vols. Freiburg, 1886 et seq.). In conjunction with Von Gebhardt alone the Tecte und Untersuchungen zur Geschichte der altehristlichen litteratur (Leip. 1882 et seq.). He is also joint-editor of the Theologische Litteraturzeitung established by Schinrer (1876).

Another son, Enich, has made a name by his researches in physiological and pathological chemistry, and fills a chair at Halle. A third, John Axel, is the author of important works on the differential and integral calenlis; and yet another, Otto, of an interesting volume on Goethe.

Haro, a town of Spain, 31 miles by rail NW. of Logioffo, is prettily situated on the right bank of the Ebro. Good red wine is grown in the neighbourhood. Pop. 6500.

Haro, The Cray of, an old form of appeal in Nomandy and the Channel Islands, equivalent to a demand either for protection against bodily harm or for assistance to arrest an adversary. The word was anciently understood to be an appeal to Rolf, Rollo, or Ron, the first Duke of Normandy; a better derivation seems to be from the Old High German hera or hara, 'here,' making haro simply a cry for aid.

Haroeris, the elder Horus, son of Scb, the Egyptian Saturn, and Nu, or Rhea. He was the brother, and not the son, of Osiris, from whom he is to be distinguished; and he was also lord of the Sonth and Nubia, and particularly ruler over the heaven. He was identified with the sun and Apollo, and represented as hawk-headed, wearing the crown of the upper and lower world. See Horres, Osiris.

Harold I., surnamed Harefoot, king of Eugland, was the younger of Canute's two sons by his first wife, Alfgiva. On the death of Canute in 1035, the witan bestowed upon Harold all the provinces north of the Thames; while the possession of Wessex in the south was given up to Canute's second wife, Emma, for her son Hardicanute. But in 1037 Wessex also submitted to Harold. Beyond a futile invasion of the country by Alfred, son of Ethelred, and raiding incursions by the Welsh and Scots, Harold's reign was

marked by no events of importance. He died at Oxford in March 1040.

Harold II., the last of the native English kings, was the second son of Earl Godwin by his Danish wife Gytha, the sister of Earl Ulf, and was horn about 1022. At an early age he was made Earl of the East Angles, and he shared his father's outlawry in 1031, finding a vefuge in Iroland. Next year, together with his brather Leofwin, he crossed the Channel with nino ships, defeated the men of Somerset and Devon at Porlack, and ravaged the eountry, next joined his father at Portland, and shared the triumph of his return. Harold was at once restored to his carldom, and next year (1033) succeeded to his father's carldom of the West Saxons. Hencoforward he was the right hand of King Edward, and still more after the deaths of the dld Earls Leofric and Siward, he directed the whole affairs of the kingdom, with an unusual union of gentleness and vigour. His brother Tostig succeeded Siward as Earl of the Northumbrians in 1055, and two years later two other brothers were raised to earldoms: Curth to that of the East Anglians, Leofwin to one formed out of Essex, Kent, and the other shires round about London. Meantime Harald drove buck the Welsh maranders of King Griffith out of Herefordshire, and added that post of dauger to his earldom. The death in 1057 of the Etheling Edward, the son of Edmund Ironside, who had been brought back from Hungary as heir to the throne, opened up the path for Harold's ambition, and from this time men's eyes rested on him as their future king. And nature had equalled fortune in her kindness, for his handsome and stalwart figure and his gentle and conciliatory temper were kingly qualities that sat well upon his sagacity, his military skill, and his personal courage. Harold's policy throughout was thoroughly English, contrary to the predominant French influences that had governed the early part of Edward's reign. He was English in everything, even to his preference for secular priests to mouks. He made his pilgrimage to Rome in 1058, and after his return completed his church at Waltham, known later as Waltham Abbey. In 1063, provoked by the fresh incursions of Griffith, he marched against him, and by making his men put off their heavy armour and weapons, and adopt the Welshmen's own tactics, he was able to traverse the whole country, and beat the enemy at every point. Griffith was killed by his own people, whereupon Harold gave the government to the dead king's brothers, Bleddyn and Rhiwallon, who swere eaths of fealty both to King Edward and

It is impossible to say exactly at what date occurred that famous visit of Harold to the court of Duke William in Normandy, of the results of which the Norman writers make so much, although with many contradictions, while the English writers with the most marked and eareful unanimity say nothing at all. It seems most likely that Harold did make some kind of oath to William, most probably under compulsion, when he had fallen into his hands after being shipwrecked on the coast of Ponthicu, and imprisoned by its Count Guy. Mr Froeman thinks the most probable date to be 1064. It is at least certain that Harold helped William in a war with the Bretons, and in the Bayeux tapestry we see his stalwart form lifting up two Normans at once when they were in danger of heing swept away by the river Coesnon which divides Normandy from Brittany. The Norman writers make Harold formally swear fealty te William, promising to marry one of his daughters, and we are told that additional sanctity was given to this oath by its being made upon a chest full of the most sacred relics.

In 1065 the Northumbrians rebelled against the rule of Tostig, and Harold found himself compelled between policy and a sense of justice to side with them, and to acquiesce in their choice of Morear and the banishment of Tostig. At the beginning of 1066 King Edward died, his last breath being to He was crowned on January 6, and at once set himself with steadfast energy to consolidate his kingdom. At York he won over the reluctant men of Northumbria, and he next married Ealdgyth, Griffith's widow, in order to seeme the alliance of her hrothers, Morear and Edwin. His short reign of forty weeks and one day was neenpied with incessant vigilance against the attacks of two formidable enemies at once. Duke William lost no time in beginning his preparations for the invasion of England, and Tostig, after trying the Normans and the Scots, and filibustering along the coasts on his own account, succeeded in drawing to his side the famous Harold Hardrada, king of Norway. In the month of September the two reached the Humber, and Harold marched to meet them, resting neither day nor night. The Icelandic historian Snorro in his dramatic narrative of the fight tells how Harald rode out accompanied with twenty of his houseearls to have speech with Earl Tostig and after him peace, and when asked what amends King Harold should have for his trouble in coming, replied, 'Seven feet of the ground of Engeouning, replied, 'Seven feet of the ground of England, or more perchance, seeing he is taller than other men.' At Stamford-bridge Harold overtook his enemy, and after a bloody struggle won a complete victory (September 25, 1006), both Tostig and Harold Hardrada being among the slain. But four days later Duko William landed at Povensey. Harold marched southwards with the utmost heate, bringing with him the most of the utmost haste, bringing with him the men of Wessex and East Anglia and the earldons of his hrothers; line the two earls Edwin and Morear held aloof and kept back the men of the north, although some of the men of Mercia, in the earldon of Edwin, followed their king to the fatal struggle which was fought out from nine in the morning till past nightfall on the 14th October 1066. The English fought with the most stubborn corrage, and the battle was only lost by their allowing the pretended flight of the Normans to draw them from their impregnable position on the crest of the hill, ringed with an unbroken shield wall. On its slope right in front of the Norman army waved the golden dragon of Wessex, as well as the king's own standard, a fighting man wrought upon it in gald. Here Harold stood with his mighty two-handed axe, and howed down the Normans as they came. Before nightfall he fell pierced through the eye with an His honseearls fought where they stood till they fell one by one; his brothers Gurth and Leofwin died beside bim. The king's body was found upon the field, recognised only by a former mistress, the fair Eadgyth Swanneshals ('Edith of the swan's neck'). At first William ordered it to be Imried on the rocks at Hastings, but seems after to have permitted it to be removed to Harald's own church at Waltham. Than Harold no braver er church at Waltham. more heroic figure ever filled a thrane; na king ever fought more heroically for his crown. If he failed, it was because he had to bow his head to fate, and in his doath he saved all the honour of his family and his race. His tragic story has given a subject for a romance to Lytton, and for a stately drama to Tennyson. For the history, see vols. ii. and iii. of Freeman's History of the Norman Conquest.

Harold I., surnamed HAARFAGER ('Fairhaired'), the first king of all Norway, was the son of Halfdan the Black, the most powerful of the jarls or petty kings of sonth-eastern Norway. According to the popular story, he loved a high-

born maiden named Gyda, but she declared she would not be his wife until he was sole king of Norway; he in his turn thereupon took an oath that he would neither cut nor comb his hair until he had accomplished her bidding. After a severe struggle of some years' duration (863-872) he subdued, first the chiefs between Throndhiem and the Sogne Fjord, and finally the kings of the southwest, whom he defeated in a naval battle near Stavanger. The conquered districts he placed under the rule of his own jarls, or such as were devoted to his service. This led many of the old nobles to emigrate to the Orkneys, the Hebrides, and to Iceland, whence they conducted a series of piratical expeditions against Norway, until at length Harold was constrained to sail westwards and chastise them in their own seas. In his old age Harold divided his territories amongst his sons, and died at Throndhjem, which he had made his capital, in 933, leaving the supreme power to his son Eric, surnamed Bloody-Axe.

Harold III., surnamed HAARDRAADE or HARDRAAD ('stern in council'), king of Norway, and one of the most famous of the old Viking chiefs, was a descendant of Harold I. Whilst still a boy he was present at the battle of Stikklestad (1030), in which his brother, St Olaf, king of Norway, was slain. Harold himself sought an asylum at the court of his relative, 'Yaroslaff, prince of Norgorod. Thence, going on to Constantinople, he became captain of the Varangians or Scandinavian bodygnard of the Greek emperors, and in command of them defeated the Saracens in several battles in Sicily and Italy. On his return to Constantinople, he drew upon himself the vengeance of the Empress Zoe, whose proffered love he rejected, and with difficulty made good his escape to Russia, where he married the daughter of Duke Yaroslaff. But he did not remain in Russia. He returned about 1045 to Norway, where his nephew, Magnus (the son of St Olaf), agreed to divide the supreme power with him, in exchange for a share of his treasures. The death of Magnus in 1047 left Harold sole king of Norway, and Svend king of Denmark; but with Svend Harold waged unrelenting war until 1064. This king changed the capital of Norway from Throndhjen to Opslo, now a snbrrh of Christiania. Two years later he landed in England, to aid Tostig against his brother Harold, king of England, but was slain in battle at Stamford-bridge, where also the flower of his warriors fell.

Haroun, surnamed Al-Raschid (more properly Harún er Rashíd, 'the orthodox'), the most renowned of the Abbaside califs, was born in 763, and succeeded his elder brother, El Hádi, in the califate, in the year 786. He owed his peaceful accession to the sagacity of the Barmecide Yahya, whom he at once made his grand-vizier. To him and his four sons he left the entire administration of his extensive kingdom; and the energy of their administration, the enforcement of order, and the general prosperity of the country proved that his confidence was not misplaced. Meantime Haroun gave himself up to the pleasures of life, and his own taste and hospitality quickly made his court at Bagdad a brilliant centre of all the wit, learning, and art of the Moslem world. Himself an accomplished scholar and poet, he gathered round him the best scholars, poets, and musicians of his age, and heaped rewards upon them with lavish prodigality. Towards the end of his reign a strange and deeply-rooted hatred towards the Barmecides (q.v.) filled his mind, and in 803 he caused the vizier, his four sons, and all their descendants save one, to be executed, not even excepting his favourite Jaafer (Giafar), who had been his constant companion in his famous but apoeryphal

noeturnal rambles through the streets of Bagdad. But the retribution of heaven quickly followed; his affairs fell into irretrievable confusion; treason and rebellion, no longer dreading the fai-reaching arm of the able vizier, showed themselves in every corner of the empire; and, when it was too late, Haroun repented bitterly his ferocious cruelty. To quell a formidable rising in Khorassan, in the north-east of the empire, Haronn marched in person against the rebels, but an attack of apoplexy obliged him to remain behind in Tûs, where he soon afterwards died, in the month of March 809. Haroun the Magnificent is the hero of many of the stories in the Arabian Nights, which have thrown a false halo round his memory; for with all his enlightenment, there was room in his heart for the most merciless and blood-thirsty ferocity. See Gibbon's History, Weil's Gesch. der Chalifen, and Professor E. H. Pahner's sketch in the 'New Plntareh' series (1880).

Harp, a musical stringed instrument, much esteemed by the ancients. In Egypt it attained an early and unequalled maturity, and is delineated in the sculptures from the earliest ages in many different forms. The great Egyptian harp stood nearly 7 feet in height, and carried 18 sonorous bass and tenor strings. Its immense frame shimmered with all the colours of the rainframe shimmered with all the colours of the rainbow, and was further ornamented with massive carrings, gold, and precions stones. The Assyrian and biblical harp was a small instrument, easily earried in the hand, and resembling more a Lyre (q.v.) than a true harp. The harp was not in use among the Greeks and Romans; but the kantela, to which the Finns chanted the Kalevala, was a sort of primitive harp. The Celtic bards held the instrument in the greatest honour. The old Scottish harp was about 3 feet high, a foot and a half broad, and carried about thirty strings. Seven harps earlier than the 18th century are in existence, and are described in Hipkins' Musical Instruments, Historic, Eare, and Unique (1889). Instruments, Historic, Rare, and Unique (1889). The Welsh triple harp is a large instrument, furnished with three rows of strings. Of these, two rows are tuned in unison and in the diatonic seale, the remaining one in the sharps and flats of the chromatic. In Ireland the harp was so of the chromatic. celebrated an instrument in the remotest times that the Italians of the middle ages believed their harp to be derived from Ireland. The most familiar forms of harp are the Italian, the medieval, and the pedal harp. The first is strung with two rows of pedal harp. The first is strung with two rows of wire-strings, separated by a double sound-board; this kind is now little used, being very imperfect. The second is in the form of a triangle, with a sound-board and gut-strings; it is always tuned in the principal key of the nunsic, while the strings are altered to suit any modulations out of the key, by pressure of the finger, or turning the tuning-pins of certain notes. The adaptation of the harp to the modern ehromatic scales led to the invention of the pedal harp, which has seven pedals, by which each note of the diatonic scale, in all the different octaves, can be made a semitone higher. The compass of the pedal harp is from contra F to D of the sixth octave above. In order to have the B flat, it must be tuned in the key of E flat. The music for the harp is written in the bass and treble clef, the same as pianoforte music. A celebrated harpist, Hochbrucker, in Donauwörth, invented the pedals in 1720; others say they were invented by J. Paul Verter, in Nuremberg, in 1730, who at least added the piano and forte pedal. The facility of playing chromatic intervals, and in different keys, was still more completely attained by the inventorial of the property of tion of the double action pedal harp by Erard in Paris, in 1810. By means of Erard's invention, each string can be sharpened twice, each time a

semitone, so that the C string may be C flat its full length, C natural by the first movement of the pedal, and C sharp by the next movement. The double-action harp is tuned in the key of C flat.

Marpe, Jean François de la. Sec La Harpe.

Marper and Brothers, a well-known finn of New York publishers, consisted originally of James (1795–1869), John (1797–1875), Joseph Wesley (1801–70), and Fletcher (1806–77). James and John commenced to publish in 1818, and, under the style of J. & J. Harper, issued about 200 works. The firm of Harper and Brothers was established in 1833, and is now carried on by the descendants of the founders; it has large publishing promises in New York city, where about 1000 persons are employed. Besides books, the firm issues Harper's Magazine (monthly, since 1850), Harper's Weekly (since 1857), Harper's Bazar (fashions, social life, &c.; since 1867), and Harper's Young People (since 1881).

Harper's Ferry, a post-village of West Vinginia, situated among beautiful scenory at the confluence of the Shenandoch with the Potomac, where the latter is crossed by a bridge, 81 miles W. of Baltimore by rail. It was the seeme of John Brown's abolition raid in 1859; and here a Union army of over 11,500 men, under General D. H. Miles, surrendered to Stonewall Jackson in 1862. The atsenal and armonry were burned in 1861, to prevent their falling into the hands of the Confederates. Pop. 764.

Marpocrates, the name given by Greek writers to the younger Horns, the hieroglyphical inscriptions calling him Harpa khrut, 'Horns the child,' the son of Osiris Isis. See OSIRIS, EGYPT, HAROERIS.

Harpoon. See Whale.

Harp-shell (Harpa), a genus of gasteropodous



Haip-sholl (Harpa imperialis).

molluses of the whelk family (Buccinidæ), having the last whorl of the shell large, and covered with unmerons sharp smooth ribs, resembling the strings of a harp. The foot is large, and there is no opcieulnu, These shells are elegantly marked, and much prized for their beauty. Nine species are known, all of them tropical, and living in deep water, on soft, sandy, or muddy bottoms.

Harpsichord, a keyed musical instrument, formerly in extensive use, but now little known. There were three shapes: the 'grand' form, resembling a grand piano; the oblong, often called spinet or virginal; and the upright, this type very rare. The sound from the strings was produced by a small piece of crow-quill, or a piece of hard leather, which projected out of a slip of wood, called the jack, that stood upright between the strings, and was pushed upwards by the key, till the quill or leather twitched the string, causing a brilliant, but somewhat harsh sound, entirely delicient of any means of modification in respect to loudness or softness. Specimens of the harpsichord, although now becoming more rare, are still to be found in good preservation, but are regarded rather as articles of vertu or curiosity than as useful musical instruments. Many thalian and Dutch harpsichords were highly ornamented by the most eminent artists with valuable

panel paintings on the inside of the lid. The date of the invention of the harpsichoid is uncertain. It is first mentioned in the rules of the Minnesingers by Ebenhard Cersne, in 1404, which places its invention in the preceding century. It was known in England in the 15th century, as mention occurs of it in a MS. dated 1502, where it is alluded to as no novelty. The Ruckers family were the great makers in Antwerp in the 16th and 17th centuries. In the 18th century Kirkman, and later Broadwood and Shudi, were the famous makers in London. The harpsichord will be remembered in history as the instrument on which Bach and Handel played. After the invention of the pianoforte, the harpsichord in all its varieties was gradually superseded by the new instrument. See Pianoforte.

Harpy, a fabulous creature in Greek mythology, considered as a minister of the vengeance of the gods. Various accounts are given of the numbers and parentage of the Harpies. Homen mentions but one, Podarge; Hesiod enumerates two, Aello and Okypete, daughters of Thammas by the Occanid Electra, fair-haired and winged maddens, very swift of flight. Three are sometimes recognised by later writers, who call them variously daughters of Poseidon or of Typhon, and describe them as hideons monsters with wings, of fleree and loathsome espect, with their faces pale with hunger, living in an atmosphere of filth and stench, and contaminating everything that they approached. The most celebrated tradition regarding the Harpies is connected with the blind Phinens, whose meals they carried off as soon as they were spread for him, a plague from which he was delivered by the Argonauts, on his engaging to join in their quest. The Boreads Zetes and Calais attacked the Harpies, but spaced their lives on their promising to cease from molesting Phinens. Virgil locates them in the Stophades.—A harpy in heradity is represented as a vulture, with the head and breast of a woman.



Harpy Engle (Thrasactus harpyia).

The name harpy is also applied to a raptorial bird of the family Falconide (Thrasactus harpyia), an inhabitant of the great tropical forests, where it preys upon all quadrupeds, except the most powerd, chiefly, however, on monkeys and sloths; even children are said to have been carried off by it. It

is somewhat larger than the golden eagle (measuring 38 inches in length as against 32), and its beak and talons are everptionally large, giving it a ferocious aspect; but its wings are comparatively short, and its flight, for a hawk, is slow and heavy. Its colour on the back and sides of the neck, on the back and on the wings, is black; the head gray; the front of the neck, breast, and belly white; the tail black and gray above, black and white in transverse bands below. Around the eyes the feathers are disposed in a radiating fashion, and form a crest on the back of its head, increasing the ferocity of its aspect. It inhabits the tropical regions of South America, from Bolivia and Paraguay to Mexico.

Harquebus. See Arquebus

Harrier, a breed of dog used to hunt the hare by scent. The harrier probably owes its origin to the foxhound, though in some packs the strain has been kept pure for many generations. In appearance the harrier closely resembles the foxhound both in shape and colour, but is on a considerably smaller scale. The harrier, though deficient in speed, is able to hunt a much colder scent than the foxhound. They hunt in packs; and the sport forms an element in English country life similar to foxhunting.

Harrier (Circus), a genus of non-arboreal Falconider, of slender build, with a sourewhat weak, unnotehed bill, with soft plumage and a slightly owl-like ruff on the face, with long legs and wings, and a characteristic gliding flight along the ground.



Hen-harrier (Circus cyaneus).

They live in the open country, are fond of marshy districts, and dexterously catch frogs, birds, and small mammals. The females are usually larger and darker than the males; the young are like the mother-hirds; the nest is almost always on the ground, and the eggs (3 to 5) are white or blotched. The British species of harrier are (1) the Hen-harrier (C. cyaneus), almost exterminated in England, but still not uncommon in some parts of Scotland; (2) the Marsh-harrier or Moor-buzzard (C. ceruginosus), all but extenminated throughout Britain; and (3) Montagu's Harrier (C. cinerascens), never more than an occasional visitor. The marsh-harrier is abundant in many parts of North America.

Harriers. See Athletic Sports.

Harrington, James, author of the Oceana, a celebrated work, half romance, half treatise on political philosophy, written for the purpose of setting forth the best form of government for a commonwealth. The son of Sir S. Harrington of Exton, in Rutlandshire, he was born in January

1611, studied at Oxford under Chillingworth, and then spent some years on the Continent. In 1646, although a republican by conviction, Harrington was appointed one of the personal attendants of Charles I., and on the king's execution accompanied him to the scaffold. It was after this event that the Orcana was written; it was published in 1656. The salient points of the political doctrines therein expounded are these: the real basis of power is property, especially landed property; accordingly landed property should be distributed and held in such a way that no one person should derive from it more than a fixed amount of revenue; the rulers of the commonwealth should be changed every three years, their places being taken by others, elected by ballot. After the Restonation Harrington was aniested for alleged conspiracy, and during a severe imprisonment lost his reason. He died at Westminster, 11th September 1677. His writings, consisting, besides the Oceana, principally of essays, &c. in defence of his magnum opns, were first edited by Toland in 1700. The Oceana was reprinted by Henry Morley in 1887.

Harrington, Sir John, born in 1501 at his father's seat of Kelston, near Bath, studied at Eton and Christ's College, Cambridge, and afterwards was attached to the court of Queen Elizabeth, who had been his god-mother. His wit brought him into much favour, which he endangered by the freedom and the political allusions of his sathes. In 1599 he served under Essex in Ireland, and was knighted by him on the field, much to the queen's displeasure. To fortify his application to King James for the office of Chancellor-archbishop of Ireland he composed, in 1605, 1 Short View of the State of Ireland, a most interesting and singularly modern essay (fust edited by Rev. W. Dunn Maciay, 1880). He died of dropsy in December 1612 He is now remembered chiefly as the translator of Ariosto's Orlando Furioso (1591) into English verse. His other writings were some Rabelaisian pamphlets, a number of fair epigrams, and A Brief View of the State of the Church, written for the Prince of Wales.

Harris, in the Hebrides, comprises the southern portion of the island of Lewis and a number of adjacent islets. Pop. 4814. See Lewis.

Harris, Howel, one of the fathers and founders of Welsh Calvinistic Methodism, was born in 1713 at Trevecca, in the country of Brecon. His mind was first seriously awakened to religions questions in 1735, and for seventeen years from that date he spent his time as a lay itinerant preacher, but confined his ministrations for the most part to Wales (see METHODISTS). After his retirement to Trevecca in 1752 he still continued to preach daily at his own home; and in order to accommodate those who came to hear him he built a large house, the inmates of which led a kind of monastic life. Harris died on 21st July 1773. See his Autobiography (1791) and W. Williams, Welsh Calvinistic Methodism (1872).

Harris, James. a pre-scientific philologist, was born at Salisbury, July 20, 1709. His mother was a sister of the third Earl of Shaftesbury, author of the Chamateristics. He had his education in his native city and at Wadham College, Oxford, whence he passed to the study of law at Lincoln's Inn. Finding himself at twenty-four on his father's death master of an ample fortune, he devoted himself to the assiduous study of the elassics, but in 1761 he entered parliament, and later became Lord of the Admiralty, of the Treasury, and secretary and comptroller to Queen Charlotte. In 1744 he published a volume consisting of three treatises, on at, on music, painting, and poetry, and on happiness; and in 1751 his famous Hermes, an

interesting but scarce profitable inquiry into the philosophical basis of universal grammar. His incomplete Philosophical Arrangements, a study of the Aristotelian logic, was issued in 1775; and his Philological Inquiries on style and the true eanons of literary criticism, in three parts—the last written in French (1780-89). He died in December 1780. Harris's works were collected, with a short life, by his son, the first Earl of Malmesbury (2 vols. 4to, 1801; 5 vols. 8vo, 1803).

Harris, Joel Chandler, an American anthor, was born in Eatonton, Georgia, 8th December 1848, and was in turn printer, lawyer, and journalist. His delightfully original and unexpected book, Uncle Remus, his Songs and his Sayings: the Folklore of the Old Plantation (New York, 1880), quickly carried his name even to the Old World, at once to children and to scientific students of folklore. Later works are Nights with Uncle Remus (Boston, 1883), Mingo and Other Sketches (1883), and Daddy Jake the Runaway, and Short Stories (1889).

Harris, Thomas Lake, founder of the Brotherhood of the New Life, was born at Fenny Stratford, in Buckinghamshire, 15th May 1823, accompanied his tather to America, and had in turn been a Universalist pastar, and faunded an 'Independent Christian Society,' when in 1850 he was drawn into the spiritualistic movement. He lectured in Great Britain in 1858, and on his return to America reorganised his society as the 'Brotherhood of the New Life.' Property was not held in common, and farming and industrial occupations were engaged in by his followers, numbering at one time about 2000 in America and Great Britain, amongst them Lady Oliphant and her son Laurence Oliphant. Harris was again in Europe in 1866. Latterly he settled in California. His community had no written creed or form of government. Harris acted as the inspired head of the Inotherhood, his system combining the doctrines of Swedenborg and of Fourier, while maintaining the anthority of the Scriptures and the sacredness of the marriage tie. He also taught that (tod is two-inone, infinite in fatherhood and motherhood, and that all who become angels find their counterpart in sex, and are two-in-one to all eternity. Harris has published many works in prose and poetry, amongst which are Wisdom of Angels (1856); Arcana of Urristianity (1857); Modern Spiritualism (1860), &c. The influence of the teaching of Harris may be traced in Laurence Oliphant's Symmeumata (1885) and his Scientific Religion (1888); as also in Pulsford's Morganithe (1881). See William Oxley's Modern Messiahs and Wonderworkers (1889).

Harrisburg, the capital of Ponnsylvania, is situated in the midst of beautiful scenery on the left bank of the Susquehauna River, which is here crossed by several long bridges, 106 miles W. by N. of Philadelphia. It contains the capitol, a count-house, tho state arsenal, the state insane asylum, and a Roman Catholic cathedral and some forty other churches. The state library has some 60,000 volumes. The city has a munber of blast-furnaces and rolling-mills, and large manufactures of steel and non, including boilers, machinery, nails, and files; cotten goods, flour, bricks, shoes, brooms, &c. are also produced, and there is a large trade in humber. Founded in 1785, Harrisburg became the state capital in 1812, Pop. (1870) 23,104; (1880) 30,762.

Harrison, a town of New Jersey, on the Passaic, opposite Newark, with which it is connected by a bridge. It has manufactures of oil cloth and enamelled cloth, wire, thread, &c. Pop. (1880) 6898; (1885) 6806.

Harrison, Benjamin, twenty-third president of the United States, was born at North Bend, Hamilton connty, Ohio, August 20, 1833. His father, the third son of President William Henry Harrison, was a small farmer, who, however, managed to educate his nine children; and Hamison, after two years at a school called Farmer's College, near Cincinnati, was transferred to Miani University, at Oxford, Ohio, where he graduated in 1852. In 1854 he settled as a lawyer in Indianapolis, where his first carnings were as a crier of the Federal court. In a short time he was in thill practice in all the courts. In 1860 he became candidate for supreme court reporter of Indiana, by nomination of the Republican party, and was elected. Entering the Union amy pending the term, the office was declared vacant. In 1864 his party re-elected him with a largely increased majority. He remained in military service, however, and only resumed the reportership upon numster-out at the end of the war. He began his military career in 1862 by raising a company, in which his first commission was of second-lientemant. Ho was then made colonel of the 70th Regiment Indiana Volunteers, and ordered to Kentucky. Carrying his studions habits into cump, he became a proficient drill-mastor. As colonel, sometimes brigade-commander, in the first division 11th Army Corps, he participated in Sherman's Atlanta campaign, distinguishing himself in the battles of Resaca and Peach Tree Creek, and he was in 1865 commissioned brevet-brigadier-general. He also tack part in the battle of Nashville, under Thomas, in December 1864.

Returning to the law in Indiana, Harrison declined a third nomination as supreme count reporter. He took an active part in the Grant campaigns of 1868 and 1872, and was nominated for the governorship of the state in 1876; but, though he polled 2000 votes more than the rest of his party, he was defented. Two years later he presided over the State Convention, and in 1880 he appeared in the Chicago Nutional Convention as chairman of his state delegation. He then declined the use of his name for the presidential nomination; and he afterwards also declined a seat in the cabinet of President Garfield. In 1884 he was again delegate at-large, and was discussed as a possible nominee for the presidency. In 1880 he was elected United States senator from Indiana; but at the end of his term of six years he was defeated for re-election, and returned to his law office. At the National Republican Convention (1888) in Chicago Hanison received the presidential nomination; President Cleveland was put forward by the Democrats for re-election. The contest, which from the first was a keen one, turned on the question of protection or free trade, and Hurrison's election signified the triumph of the former for the time. On March 4, 1889, he was formally inaugurated president. See the Life by General Lew Wallace (1888).

Harrison, Frederic, was born in London, October 18, 1831, and was educated at King's College School, London, and Wadham College, Oxford, taking a classical first-class in 1853. He became Fellow and tutor of his college, but was called to the bar in 1858, and thereafter practised conveyancing and in the Courts of Equity. He sat on the Royal Commission upon Trades-unions (1867-69), served as secretary to that for the Digest of the Law (1869-70), and from 1877 till 1889 was professor of Jurisprudence and International Law at Lincoln's Lin Hall. A Positivist in roligion and an advanced Liboral in politics, he has argued his opinions in many vigorous and well-written articles in the magazines and reviews, some of which have been reprinted separately. Of his works the chief

are The Meaning of History (1862), Order and Progress (1875), The Present and the Future (1880), Lectures on Education (1883), On the Choice of Books (1886), and Oliver Cromwell (1888). He contested London University in 1886 as a Homerule candidate, but without success. In 1889 he was elected an alderman by the London County Council.

Harrison, John, the inventor of the chronometer for determining longitude at sea, was born at Foully, near Pontefract, Yorkshire, in 1693. His mechanical genins, which showed itself at an early age, led him to study the construction of clocks and watches, with a view to diminish as much as possible their errors and irregularities, and by 1726 he had constructed a timekeeper provided with compensating apparatus for correcting errors due to variations of climate. In 1714 the government had offered prizes of £10,000, £15,000, and £20,000 for the discovery of a method for determining the longitude within 60, 40, and 30 miles respectively. After a long period of persevering labour Hairison made a chronometer which, in a voyage to Jamaica in 1761-62, was found to determine the longitude within 18 miles. After another voyage to Jamaica, and further trials, he was awaided the prize of £20,000 in 1765 and 1767. The success of Harrison's chronometer is owing to the application of the compensation curb to the balance wheel; and on the same principle he invented the gridiron pendulum for clocks. Besides these, he invented the going fusee and the remontoir escapement (see Honology). Harrison died in London, 24th March 1776. He wrote Description of such Mechanism as will afford a Niccor True Measurement of Times. See The Principles of Mr Harrison's Timekeeper (1767).

Harrison, Thomas, regicide, was born at Newcastle-under-Lyme in 1606, and joined the parliamentary army at the opening of the Civil War. He commanded the guad that carried the king from Hurst Castle to London, sat among his judges, and signed his death-warrant. He did good service at Worcester, but was too nncompromising alike in religion and politics to favour Cromwell's tolerant ideas, and was accordingly deprived of his commission, and later imprisoned for his share in some of the plots hatched by the more irreconcilable bigots. With characteristically stubborn heroism he wantd not fly at the Restoration, and was soon seized, tried, and condemned to death. He died bravely, October 13, 1660, with the words on his lips, 'If I had ten thousand lives, I could freely and cheerfully lay them all down to witness to this matter.'

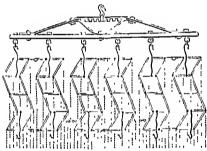
Harrison, William, the chief of Holinshed's coadjutors, was born in London, educated at St Paul's and Westminster, and studied first at Oxford, next at Cambridge, graduating B.D. at the latter in 1569. He became household chaplain to William Brooke, Lord Cobham, who presented him to the rectory of Radwinter, in Essex, which he held all his life, together for ten years with the vicarage of Wimbish in the same county. In 1586 he was installed canon of Windsor, and died in 1593. Almost all we know of him he has told us himself, even to his gardening and his brewing; and he impresses his readers throughout as a learned, honest, and singularly open-eyed although untravelled man. When he wrote the hook by which his name is remembered one Trinity term in London, he was more than forty miles from his books, and he tells us further that till recently, except in visits to the universities or to Lord Cobham's house in Kent, he had never gone a forty miles' journey in his life. But at that time he had the advantage of access to the valuable manuscripts

of Leland. The fruit of his application was his famous Description of England, as well as his Description of Britain, written for Holinshed's Chronicle. In the 'Epistle Dedicatorie' he tells us he had an 'especial eye unto the truth of things;' and further that he was 'the first that hath taken upon him so particularly to describe this He of Britain.' The former is especially interesting to us as a vigorous and elaborate account of the conditions of life in the England of Shakespeare's day, treating in succession, with some fullness of detail, subjects so diverse as the church, the bi-hoprics, the universities, the may, the food, apparel, anmour, the beggars and togues, laws, punishments, buildings, cities, parks, gardens, fairs, and markets. The second and third books of the Description of England were edited by Dr Firnivall, for the New Shakespeare Society (parts i.—iii. 1877—81). The whole work is of course reprinted in all editions of Holinshed.

Harrison, William Henry, ninth president of the United States, was born in Charles City county, Virginia, 9th February 1773. His father, Benjamin Harrison (1740-91), was one of the signers of the declaration of independence, which, as chairman of committee, he reported to congress on 4th July 1776. There is a popular legend, seemingly unfounded, that makes the family descended from Harrison the regicide. After his father's death, William joined the army which Wayne was leading against the North-western Indians, and showed great gallantry at the battle on the Miami (1794). He left the army in 1798. He represented the North-west Territory as a delegate in congress in 1799-1800, and succeeded in passing a valuable law relating to the sale of the federal land in small parcels; and when Indiana Territory was formed (1800), including the present states of Indiana, Illinois, Michigan, and Wisconsin, besides parts of Minnesota and Ohio, he was appointed its governor. He laboured courageously to avert war with the Indians, but was compelled to quell Tecumseh's outbreak, and beat off a ficree and treacherous attack, ending in an important battle at Tippecanoe (7th November 1811). In the war of 1812-14 he was appointed to the chief command in the north-west, repulsed the British force under Proctor, and by the victory of Perry on Lake Erie was enabled to pursue the invaders into Canada, where, on 5th October 1813, he totally routed them in the battle of the Thannes. In 1814 he resigned his commission. In 1816 he was elected to congress, and in 1824 became a United States senator. In 1828 he went as ambassador to Colombia, but was recalled in 1829, and for twelve years was clerk of a county court in Ohio. He received 73 electoral votes for the presidency of the United States in 1836 against Van Buren's 170; but four years later, the Whig party having mnited, he defeated Van Buren, obtaining 234 electoral votes to the latter's 60. The contest is noteworthy as having witnessed the introduction of the enormous mass-meetings a

Harrogate, or Harrowgate, a wateringplace in the West Riding of Yorkshire, lies among the moors, 450 feet above sea-level, and by rail is 17 miles N. of Leeds and 20 WNW. of York. It consists of two parts, High and Low, and is celebrated for its sulphureous, saline, and chalybeate springs. The sulphureous springs are of laxative and diuretic quality, while the chalybeate are tonic. The waters are used both externally and internally, and are in great repute in many diseases of the skin and in some cases of dyspeptic disorders, scrofula, gout, janudice, rhennatism, &c. The springs were discovered in 1596. Harrogate is a remarkably healthy place, the deathrate per 1000 ranging in six years between 14°5 and 11°7. It was incorporated as a municipal borough in 1884. Smollett's Humphrey Clinker (1771) gives a lively account of Harrogate. Pop. (1851) 3678; (1881) 9482. See Grainge's History of Harrogate (1871).

Marrow, an agricultural implement used for smoothing and pulverising ploughed land, and for covering the seeds previously sown. It consists of a frame of a square or rhombic form, in which are fixed rows of teeth, or tincs, projecting downwards. The harrow is a very ancient implement, having been in use beyond the dawn of history; but as in early times only the lighter soils were entitivated, it often consisted of bushes, or branches of trees, which merely scratched the ground. Subsequently, we find a wooden frame and wooden times in use; next, the wooden frame with iron times, a form of the instrument still in use in many parts, especially upon light soils. The barrow constructed wholly of iron is now most largely employed, and as it can be made light or heavy, works more cleanly, and is more durable, it is preferable to the old wooden form. From harrows are usually made in zigzag form as shown below. The Howard harrow has the times so arranged that no one follows in the track of another, but each has a separate line of action which greatly diminishes the risk of any



Howard's Harrow.

portion of the surface escaping pulverisation. Exceptionally strong harrows with rank teeth are made for breaking down rough or hard land. The 'chain-barrow,' which is a congeries of iron rings, is useful for covering grass-seeds, and especially for separating weeds from the earth or clods in which they are enveloped. Drill harrows are constructed to scarify the soil between raised drills and also the raised drills themselves.

Harrow, or Harrow-on-The-Hill, a town of Middlesex, 11½ miles WNW. of St Paul's, stands on a hill, 200 feet high, that looks over thirteen shires. Its 'visible church,' which crowns the hill-top, was founded by Lanfrane, and rebuilt about the middle of the 14th century. Exhibiting every style of Gothic architecture, from Norman to Perpendicular, it has a lofty spire and eleven brasses (one of them to John Lyon); whilst in the churchyard is a flat tombstone on which Byron as a schoolboy used to lie. Pop. of the parish (1851) 4951; (1881) 10,277, an increase largely due to building operations, and to the improvement of railway communication.

HARROW SCHOOL was founded in 1571 by John Lyon, a wealthy yeoman of Preston, in the parish of Harrow-on-the-Hill, who died in 1592; but the original red-brick school-house (now the name-becarved Fourth Form School) was not built till

New buildings have been added since 1608-15. 1819—the chief of these being the Second-pointed chapel (1857), with its tall slender spire and memorial glass to twenty-two Crimean officers; the Vanglan Memorial Library (1863), similarly designed by Sir G. G. Scott; and the semi-circular Speech-room (1877). The school was primarily Speech-room (1877). The school was primarily intended to afford a free education to thirty poor boys of the parish; but the statutes, drawn up by the founder two years before his death, provided also for the admission of 'so many foreigners as the place can conveniently contain; and it is to that provision that Harrow, although not richly endowed, owes its proud position among the great schools of England. Still, its fortunes have fluctuated much, the number of boys being 144 in 1721, 50 in 1745, 345 in 1803, 80 in 1845, 438 in 1859, and now upwards of 500. The study of mathematics was first introduced in 1837, of modern languages in 1851-55; and all the other branches of a modern education have followed. Music became a specialty of Harrow education under Mr J. Farmer, who was music-master here from 1862 beon superseded by cricket, footbull, rackets, &c., the Eton and Harrow cricket-untel at Loid's dating from 1818. The age of admission is twelve to fourteen; and there are six or seven entrance scholarships, of from £30 to £80 per annum, offered every Easter. Of leaving scholarships, the most valuable are Buring's three of £100 a year for five years to Hertford College, Oxford. Under the Public Schools Act of 1868 the governing hody comprises six members, elected respectively by the Lord Chancellor, the universities of Oxford, Cambridge, and Loudon, the Royal Society, and the under-masters. Among the twenty-one head-masters have been Archdeacon Thackeray (1746-60), Dr Snomer (1760-71), Dean George Butler (1805-29), Archbishop Longley (1829-36), Bishop Christopher Wordsworth (1836-44), Dean Vaughan (1844-59), Dr Henry Montagu Butler (1859-85), and the Rev. J. E. C. Welldon. Of illustrions Harrovians may be mentioned Lord Aherdeen, Bruce the Abyssinian, Charles Buller, Colonel Burnaby, Lord Byron, Churles Stuart Calverley, the Marquis of Dalhousie, Lord Dalling, Lord Goderich, the Marquis of Hastings, Lord Herbet of Lea, Theodore Hook, Sir William Jones, Cardinal Manning, Hermann Merivale, Dean Merivale, bridge, and Loudon, the Royal Society, and the dinal Manning, Hermann Merivale, Dean Merivale, Lord Palmerston, Dr Sammel Pari (a native also, and an under-master), Sir Robert Peel, Spencer Perceval, Admiral Rodney, Lord Shaftesbuy, Sheridan, Archbishop Trench, Anthony Trollope, and Sir George Trevelyan. 'Stet fortuna domus.'

See R. Pitcairn, Harrow School (1870); A. Rimmer, Rambles round Eton and Harrow (1881); and Peroy M. Thornton, Harrow School and its Surroundings (1885).

Harrowing of Hell. See HELL.

Harry, Blind, a Scottish ministrel of the 15th century. Scarcely anything is known of his life beyond what is told by John Major (or Mair) in his History of Scottand, published in 1521. 'When I was a child,' he says, 'Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a whole book of William Wallace, weaving the common stories (which I, for one, only partly believe) into veruacular poetry, in which he was skilled.' In 1490-92 Blind Harry is found at the court of King James IV., receiving occasional gratuities of five, nine, and eighteen shillings. The poom attributed to him, The Life of that Noble Champion of Scottand, Sir William Wallace, Knight, was completed before the end of the year 1488, when it was copied by John Ramsay. This copy, the oldest MS. of the work now known to

573

exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11,861 lines, of ten syllables each, is written in rhynning couplets. The language is frequently obsence, and sometimes maintelligible, but the work as a whole is written with higher than the work as a whole is written. with vigour; in some passages it kindles into poetry; and it is altogether a surprising performance, if we regard it as the composition of one who was born blind. The author seems to have been familiar with the metrical romances which were the popular literature of the time, and, though his poem has no claim to be regarded as history, he makes frequent references to original authorities which form the main groundwork of the narrative. He represents himself as deeply indebted to the life of the great Scottish patriot, written in Latin by his schoolfellow Master John Blair, the chaplain of Wallace, and to another by Sir Thomas Gray, the parson of Liberton. The poem was at one time regarded as wholly a work of fiction, but authentic documents recently brought to light have shown that though it contains a great number of mistakes or misrepresentations of well-known facts, it is on the whole a valuable and in not a few incidents a trustworthy narrative. The work is believed to have been printed in the Scottish capital as carly as 1520, but no perfect copy is known to be preserved of any earlier edition than that of Edinburgh in 1570, bearing the title of The Actis and Deidis of the Maist Hluster and Vailyeand Campionn Schir William Wallace, Knicht of Ellerslie. The work was reprinted at Edinburgh in 1594, 1601, 1620, 1648, 1673, and 1758; at Glasgow, in 1665 and 1699; also at Aberdeen and at Perth. Good editions are that by Jamieson (Edinburgh, 1820, 4to) and that by Moir for the Seottish Text Society (1885-89). The work was for about 200 years one of the west would in Scotland but gradually fell. of the most popular in Scotland, but gradually fell into neglect as its language, never very plain, ceased to be understood except by scholars. Its ceased to be understood except by Scholars. Its place was supplied by a modernised version by William Hamilton of Gilbertfield, published at Glasgow in 1722, with the title of A New Edition of the Life and Heroic Actions of the Renoun'd Sir William Wallace. This is a poor performance, but it continued to be widely circulated among the Scattish would show the surrounder. Scottish people almost to our own day

Hart, the name given to the stag or male deer, from the age of six years, when the crown or surroyal antier begins to appear.

Hart, Solomon Alexander, painter, was born at Plymouth, in April 1806, the son of a Jewish goldsmith, who in 1820 removed to London. Apprenticed first to a line engraver, in 1823 young Hart became a student at the Rayal Academy. Amongst his works are 'The Elevation of the Law' (1830), 'Isaac of York' (1830), 'English Nobility receiving the Communion' (1831), 'Henry I. receiving Intelligence of the Death of his Son' (1840), 'Milton visiting Galileo in Prison' (1847), 'The Three Inventors of Printing' (1852), &c. He also painted miniatures and portraits. In 1840 Hart became R.A., in 1854 professor of Painting, and in 1865 librarian of the Royal Academy. He died in London, 11th June 1881.

Harte, Francis Bret, was born in Albany, New York, Angust 25, 1839. His father, a teacher in the Female Seminary, died Compage 1890 in U.S. early, and the boy received only by J. B. Lippincott a common school education. He Compage, went to California with his mother in 1854, and opened a school at Sunora; but he was not successful in this, nor in mining, which he tried afterwards. He next became a compositor, and in 1857 obtained employment in the office of the Golden Era, in San Francisco. His experiences among

miners and the rough population that were attracted by the 'gold-craze' had made a powerful impression upon his mind, and his first literary efforts were sketches of the people and the scenes he had observed. These sketches attracted much attention, and as a result the anthor became one of the stall of the paper. His Condensed Novels afterwards appeared in another weekly, the Californian. He was secretary of the United States Mint in San Francisco from 1864 to 1870, and during this period wrote some of his most famous poems, among them 'John Burns of Gettysburg,' 'The Society upon the Stanislan,' &c. He founded in 1868 and edited the Overland Monthly, to which he contributed The Luck of Rouring Camp, The Outcasts of Poker Flat, Miggles, Tennessee's Partner, The Idyl of Red Gulch, and Plain Language from Truthful James ('The Heathen Chinee'). Returning to the East, he became a contributor to the Atlantic Monthly, and from time to time delivered lectures in various cities upon the pioneers of California. In 1878 he received the appointment of United States consul at Crefeld. After two years he was transferred to Glasgow, and held that post until 1885. Since that time he has resided in London, and devoted himself to literary pursuits.

Bret Harte has been a prolific writer, and almost everything from his pen bears the stamp of his original genius. This, however, is trner of the early and middle period than of the later. Generally, he is strongest in the field of which he was the discoverer; although in some instances—notably in Thankful Blassom—he has produced exquisite romances, sometimes with a pastoral flavour, wholly unlike the turbulence of the first efforts.

The mixture of southern and western people in the early rush to the goldfields seems to have produced a new dialect, but it probably had a brief existence. At least, it would be wrong to suppose that the peenliar phrases in the mining sketches (so picture-sque and shocking at once) are purt of the daily talk of the people to-day. But the dialect was not all. Harte has described or invented new types of character, and has portrayed them and their surroundings with a vivid energy that has no modern counterpart. It is difficult to say whether he has been more successful in poetry or in prose; for the same virile power appears in both, and he has evidently by nature a strong sense of melody and great facility in verse. In 'John Burns of Gettyslung' and 'Dickens in Camp' there is evidence that he might have taken a higher place among poets if he had devoted himself to serious work. But his instinct has been his guide, and has led him in the path of fame. It must be remembered that he acquired the art of effective writing by practice, without previous discipline, and that for him there was no model. Since he has shown the way, a number of men have become celebrated—in the American newspapets—by verses full of ellipses and eccentricities, and with as much of the victorious ease and dash of Bret Harte as they could borrow.

His Complete Works, collected and revised by himself, appeared in London in 5 vols. in 1881. Since then his publications have included Flip (1882); In the Carquinez Woods (1883); By Shore and Scalge (1885); Snowbound at Eagle's (1886); A Phyllis of the Sierras, and A Drift from Redwood Camp (1888); Cressy (1889); and The Heritage of Dedlow Marsh, and other Tales (1889).

Hartebeest. See KAAMA.

Hartford, the capital of Connecticut, is situated on the right bank of the Connecticut River, 50 miles from its mouth, and 112 by rail NE. of New York, with which it is also in daily communication by steamboat. It is a handsome city, with streets not all too regular, and many tasteful private houses. It has an imposing state capitol of white

marble, a state arsenal, a new post-office and United States conrt-honse; and on the outskirts are the new buildings of Trinity College (Episcopal), which was founded on the present site of the capitol in 1823 (see CLENALMOND). To the notable public buildings, besides the Wadsworth Atheneum and the high school, must be added the substantial offices of the many great insurance companies whose headquarters are established here, as well as a number of banks. Hartford contains a Congregational theological seminary, a large hispital, asylums for orphans, the deaf and dnmb, and the insure, and possesses several important libraries; it is the seat of a Roman Catholic hishop also, and has two numerics. There are extensive manufactures of Colt's pistols, Gathing gnus, engines, hoilers, and machines, hardware and other metal goods, stoneware, and wooden wares. There is also some publishing, and a very considerable trade in Connecticut tabacco. The site of a Dutch fort in 1633, and of a colony of Massachusetts settlers as early as 1635–36, Hartford was incorporated as a city in 1784, and has heen sole capital of the state since 1873. It was the seat of the Hartford Convention (q.v.). See also CONNECTIOUT. In point of population the city stands second to New Haven, which formerly shared with Hartford the rank of semi-capital. Pop. (1870) 37,180; (1880) 42,015. See The River Towns of Connecticut, by Charles M. Andrews (Johns Hopkins University Studies, 7th series, Baltimore, 1889).

HARTFORD CONVENTION, in the political history of the United States, was an assemblage of delegates from the New England States, at Hartford, Connecticut, December 15, 1814. This convention was proposed by the Massachusotts legislature. The war with Great Britain in 1812-14 had been from the first opposed by the majority of

HARTFORD CONVENTION, in the political history of the United States, was an assemblage of delegates from the New England States, at Hartford, Connectient, December 15, 1814. This convention was proposed by the Massaelmsetts legislature. The war with Great Britain in 1812-14 had been from the first opposed by the majority of the people of New England, who were Federalists, and looked upon the war as a mere party measure of the Democrats; and in face of the destruction of the commerce and the fisheries, the chief interests of New England, this convention was called with the ostensible object of devising means of security and defence. It sat twenty days with closed doors, and, as it was supposed to be of a treasonable character, it was watched by a military officer of the government. The convention prepared a report recommending the adaption of measures by the state legislatures that would protect their citizens from conscriptions and impressments, and the militia from forcible drafts; the report also proposed certain amendments to the federal constitution. No treasonable act was committed, and no treasonable intention proved; yet the suspicion of disloyal tendencies clung to the convention, and completed the min of the Federalist party, which did not survive the election of 1816. Some ground for the public suspicion was probably afforded by the fact that a section of the Federalist leaders known as the 'Essex Junto,' who had in 1804 and 1809 seriously discussed the question of dissolving the Union and forming an Eastern confederacy, were foremost in bringing the convention about; and the charge of aiming at a kingdom of New England would therefore make no sorious demand upon the credulity of partisan opponents. Yet the convention included men of the highest public character, who strenuously defended the pure purpose of its patriotism, and the charges of treasonable designs are now nearly universally regarded as baseless.

Hartington, LORD. See CAVENDISH.

Hartlepool, a municipal borough and scaport in the county of Durham, is situated on a small peninsula north of the estuary of the Tees, 12 miles NNE. of Stockton, and 18 ESE. of Durham. It formerly attracted many visitors for sea-

bathing during the summer months; but, owing to the formation of railways connecting it with the Darham coal-nines, it is no longer visited for that purpose. Its ancient sea-fishing industry is retained, and has recently extended in consequence of the demand from Yorkshire. It is the only borough in the county founded by royal charter whose charter is extant. In the 13th century Hartlepool belonged to the Brnces of Annandale in Scotland, progenitors of the royal family of that name. After Bruce ascended the Scotlish throne his English possessions were forfeited, and Hartlepool was granted to the Cliffords. The boundaries of the ancient borough have recently been extended by including the township of Throston and part of the township of Stranton, making the southern humdary conterminons with the modern borough of West Hartlepool. The local industries of Hartlepool are iron shipping trade, but that is now almost entirely transferred to West Hartlepool, where the chief custom-house and other facilities are situated. The harbour entrance is safe, and communicates by a channel direct to the more modern port. The public institutions include excellent public schools, a public hospital, an ancient parish church, and thirteen other places of worship. A substantial sea-wall and delightful promenale, completed in 1889, have added much to the attractive appearance of the town on the seaward side. Pop. of municipal borough (1851) 9503; (1871) 13,166; (1881) 17,002.

WEST HARTLEPOOL, a modern municipal borough and scaport, is situated to the south as Hartlepool is to the north of Hartlepool Bay, and practically forms one town with Hartlepool. It was founded in 1847 by Ralph Ward Jackson, an enterprising railway speculator, afterwards M.P. for the Hartlepools. It possosses a theatre, atheneum, and mechanics' institute, enstom-house, market-house, exchange, a municipal hall opened by Prince Albert Victor in 1889, a school of art, and other public buildings. The first harbonr was constructed here in 1847, of 12 acres, and has since been greatly enlarged. The dock area of Hartlepool and West Hartlepool together, including the timber and shipbuilding yards, &c., is over 300 acres in extent. Extensive iron shipbuilding-yards, cement-works, wood-pulpwerks, and marine engine-building establishments have been founded. There are graving-docks leased by the North-Eastern Railway Company, and also one extensive graving-dock open to public use. Besides coal, the following are the principal imports: Flax and benp, grain, timber, butter, cheese, fruit, cuttle, tallow, yeast, iran, zine, &c. The exports consist of woollen and cutton goods, copper, cement, drugs, machinery, carthenware, yarn, hides, &e.; the trade being carried on for the most part with the Baltic ports, Cronstadt, St Petershurg, and Danzig, and with Hamburg and Rotterdam. The export of coal from the united port is about 1,500,000 tons annually. Governed from 1854 by a local commission, the town was created a manicipal borough in 1887. Pop. of municipal district (1861) 12,603; (1871) 21,110; (1881) 28,167. By the Reform Act of 1867 'The Hartlepools' wore constituted a parliamentary horough, returning one member. Pop. 46,990. See Sir C. Sharpe's History of Hartlepool (1816; new ed. 1851).

Hartley, DAVID, philosopher, was born August 30, 1705. His father was vicar of Armley, in Yorkshire. At lifteen he entered Jesus College, Cambridge, and hecame a Fellow of the college. He studied at first for the church, but, dissenting from some points in the Thirty-nine Articles, he abandened his original intention. In his mature years

he impugned the eternity of hell-punishment, maintaining the ultimate restoration of the lost; in all other points his published opinions coincided with the Church of England, and he continued to the last a member of the church. He finally chose the profession of medicine, in which he attained considerable eminence. He practised as a physician successively at Newark, Bury St Edmunds, in London, and at Bath, where he died on the 25th of August 1757, at the age of fifty-two.

His work on the mind, entitled Observations on Man (1749), on which his fame rests, was begin when he was about twenty-live, and occupied his thoughts for sixteen years. The first part relates to the constitution of the human mind; the second treats of religion and morals. His handling of the mind turns throughout upon two theories or hypotheses, which have very different merits. The first is called the Doctrine of Vibrations, or a theory of nervons action analogous to the propagation of sound, the suggestion of which he owed to Newton, of whose writings he was a devoted student. His second and most valuable innovation consisted in showing that the faculties, powers, and feelings of the mind might be explained to a very wide extent by the principle of the Association of Ideas (q.v.); and it should be said that he was certainly the first to do justice to the applications of that principle to explain the phenomena of the mind.

The doctrine of vibrations supposed that when any one of the senses is affected by an outward object the effect was to set the particles of the nerve in a vibratory motion, which ran along to the brain, and produced corresponding vibrations in the cerebral substance. In like manner, when an active impulse proceeded ontwards to the muscles the manner of communication along the nerves was of the same kind. He even extended these molecular vibrations to the other tissues. The dislike generally entertained towards this part of Hartley's speculations arose from a mistaken notion of its involving or favouring materialism. See G. S. Bower, Hartley and James Mill (1881).

Hartlib, Samuel, was born about 1600 at Elbing, in Prussia, son of a Polish refugee and an English mother. Coming to England about 1628, he busied himself in trade, later in agriculture, and, when he had exhausted his fortune in his experiments, projected a school to be conducted on new principles. It is highly probable that his idea inspired his friend Milton's famous Tractate on Education, addressed to Hartlib in 1644, as well as Sir William Petty's Two Letters (1647 and 1648). He was granted by Cromwell a pension of £100, increased later to £300, which after the Restoration he petitioned parliament to renew. No letters of Hartlib's are extant posterior to 1662. He wrote on education and on husbandry. See Biographical Memoir of Samuel Hartlib hy H. Direks (1865).

Hartmann, Karl Robert Eduard von, German philosopher, born at Berlin on 23d February 1842. From 1858 to 1865 he served as an artillery officer in the Prinsian guards, but was compelled to abandon his calling owing to an affection of the knee. Since 1867 he has lived in Berlin, limited with the elaboration of a comprehensive system of philosophy. His activity may be divided into two periods; in the first, from 1868 to 1877, he was chiefly working out his ideas on methodology, the philosophy of the natural sciences, psychology, metaphysics, and the theory of knowledge (Erkennt-nisstheorie); in the latter, from 1878 onwards, he has been chiefly concerned with ethics, the philosophy of religion, and æsthetics. His system is a synthesis of Hegel's and Schopenhauer's systems, which he has reduced, by means of Schelling's conception of the Unconscious and his doctrine of prin-

ciples, to a concrete monism; and his substructure is built upon an empirical basis with the aid of the inductive methods employed in the natural sciences and history. In his own words—'As I have followed Scholling's precedent in uniting Hegel's one-sided identification of the world's substance with the logical Idea with Schopenhauer's similarly one-sided identification of it with Will, so I have also endeavoured to effect a higher unity hetween Hegel's coldness and want of feeling, whereby the individual is degraded to an insensitive instrument of the Idea, with whose fate, with whose weal or woe, philosophy does not concern itself, and Schopenhaner's lack of interest in the process of the All, and his insistence on the redemption of self from an individual existence of pain as the sole end of life. In a similar manner I have corrected Hegel's idea of the philosophy of religion. He has endeavoured to interpret Christianity in a false and unhistorical manner, in that speculatively he makes it the absolute religion of the intellect (Geist). This faulty conception I have amended with certain elements of thought derived from Schopenhauer, to wit, a recognition of the deep and peculiar significance of the Indian religions, of which Hegel had no comprehension and with which he had consequently no sympathy. In my ethics I have assigned to Schopenhauer's emotion morality its proper place beside Hegel's intellectual morality, and have linked Hegel's demand for the subordination of the individual to the teleological end of the absolute Idea to Schopenhauer's conception that the ethical subordination of the individual is conditioned by the unity of substance which obtains between all separate individualities and the oue world-substance. But in all these departments of thinking the richer and more important factors were contributed by Hegel's philosophy, whilst Schopenhauer's less elaborated system furnished me with complementary elements. In asthetics the only thing I had to do in principle was to emphasise still more sharply than Hegel himself has done the antithesis between his concrete idealism and the abstract idealism of Schelling and of Schopenhauer.

The great aim Ed. von Hartmann has set before himself is that of harmonising and reconciling philosophy with science, by gathering up the varied results of modern scientific investigation into an all-comprehensive philosophic conception of the world (Weltunschauung). His speculative system is commonly believed to be pessimistic in temper; but that is not the case. The Unconscious (the universal monistic principle) is both real and ideal, both will and presentation—the substantial and intelligent principles respectively. And the world-process, instead of being negative, is a process of evolutionary optimism. The substantial principle involves intrinsically an excess of pain over pleasure in the world; and this excess of pain can only be abolished by the annihilation of the substantial principle, Will, and its specific energy, willing, not, however, in individual beings, but once for all universally. The agency by which this 'best possible' consummation is to be achieved is the intellectual principle, working through its own creations, conscionsness and individuality, along the lines of progressional development. And this strikes the keynote of the philosophic temper in which Yon Hartmann writes. He is an ardent champion of evolutionary progress, a believer in the mission of western energy and enlightenment, and in its teleological justification, an admirer of the modern spirit of enterprise, its robust vigour, its keen delight in struggle and conflict, and its restless practical activity. Hence he proclaims himself as opposed to the teaching and attitude of the prophets of the Weltschmers; hence he condemns the temper of oriental passivity, the unmanly fashion of

cowering and shivering before the March blasts of misery, and despises that 'weariness ere eventide' which is now become so common amongst

Ed. von Hartmann alse gives close attention to the public questions of the day in Germany, and writes abily and clearly on such matters as education, politics, &c. The results of his activity in these departments will be found in Zur Reform des hoheren Schulwesens (1875), Die politischen Anfgaben und Zustande des Deutschen Reichs (1881), Moderne Probleme (1885), Gesammelte Studien und Aufsatze (1876)—this last containing an autobiography—and Zwei Jahrzehnte Deutscher Politik (1889), besides numerous contributiens to magazines, such as Die Gegenwart, &c.

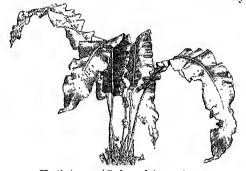
The books in which his philosophical creed is laid down bear the following titles: Philosophic des Unbewissten (1869; 10th ed. 1890; Eng. trans. by Compland, 1884); Phanomenologic des sittlichen Bewissteins (1878; 2d ed. 1886); Das religiose Bewissteem der Menschheit im Stufengang seiner Entwickelung (1882); Die Religion des Geistes (1882); Die Deutsche Aesthetit seit Kant (1886); and Die Philosophie des Sohbinen (1887). Besides these, he has written several books supplementary to his principal lines of thought, such as Kritische Gennudes transcendentalen Realismus (3d ed. 1885); Neukantianismus, Schopenhauerianismus, and Hegelianismus (2d ed. 1878); Die Selbstewetzung des Christentimus und die Religion der Zukunft (2d ed. 1874; Eng. trans. by Dere, 1886); a work on the theory of knowledge (1889); Kritische Wanderungen durch die Philosophie der Gegenwart (1890), &c. Useful helps to the study of his system are Kocher's excellent condensation, Das philosophische System H. von Hartmanns (1884), and Plumaelier's Der Pessinismus in Vergangenheit und Gegenwart (1884).

Hartmann von Aue ranks next after Wolfram von Eschenbach and Gottfried von Strasburg as a poet of the Middle High German period. He was born about 1170, of a noble Swabian family, took part in the Crusade of 1187, and died between 1210 and 1220. His writings cousist of narrative poems and sougs. The most popular of the former is Der arme Heinrich, based upon a Swabian traditionary story. Erra, which relates the legend repraduced in Tennyson's Enid' in Idylls of the King, and Irem, are both drawn from the Arthurian cycle, and closely follow French poems by Chrestien de Troyes. In Gregor vom Steine, the plot of which is of a repulsive nature, Hartmann depicts worldly passion sublued and purified by the power of religions faith, the faith of the ascetic of the church at that date. The songs belong to the erotic class and are marked by freshness and naiveté. His longer works have each been edited several times separately. F. Bech published a critical edition of Hartmann's collected writings in 1866-69 (2d ed. 1870-73).

Hartshorn, the term given in pharmacy te the antlers of the Red Deer or Cerms elaphus. Its composition is very different from that of persistent horns, as these of the ox, fer example, and is identical, or nearly so, with that of hone. The products of its distillation, containing among other things, ammonia, were formerly much used in medicine, under the titles of oil of bartshorn, velatile salt of hartshorn, spirits of hartshorn, &c.; but they are now replaced by a solution of ammonia and carbonate of ammonia, the sal volatile of the shops. See Ammonia.

Hart's-tongue (Scolopendrium), a genns of widely distributed ferns, of which one species, S. vulgare, is a native of Britain, and is common in many parts of the country, in meist woods, shady banks, caves on the seashore, and other cold and damp situations. Its frends are in general undivided—although sometimes forked—from a few inches to 2 feet in length, and from 1 to 3 inches in

breadth. The sori are in transverse lines on the lateral veins. Fine plants of this fern are very



Hart's-tongue (Scolopendrium vulgare).

ornamental, and attain their greatest luxuriance in winter.

Hartz. See HARZ.

Hartzenbusch, Juan Eugenio, a Spanish dramatic poet of German extraction, was born at Madrid, September 6, 1806, studied under the Jesuits, and produced his first book, the drama Amantes de Teruet, in 1836. His principal works, all published at Madrid, are the drama Doña Menera (1838), the comedies La Redoma Encantada (1839) and La Visionaria (1840), and the dramatic poems Alfonso el Casto (1841), El Barbiller Mendarias (1842), La Coja el Encogido (1843), and others. He also published in prose Cuentos y Fabulus (1861), Obras Escogidas (1865), and Obras de Encargo (1864). His writings are characterised by glowing imagination, vigorus diction, and sonorous versification. Besides his original works he issued good critical editions of the plays of Tirso de Molina, Calderon, and Lope de Vega. During the greater part of his life Hartzenbusch was employed in the national library at Madrid, of which he became directer in 1862. He died at Madrid, 3d August 1880.

Haran. See HAROUN.

Haruspices (Sanskrit hird, 'entrails;' ef. Gr. chordē, cholades), soothsayers or diviners among the Etruscans, and from them adopted by the Romans, who foretold future events from the inspection of the entrails of animals offered in sacrifice (hence also called extispices), and from the observation of other circumstances cannected with the offerings, such as the willingness or unwillingness of the victim to come to the altar, and the flame or the smoke. They took indications also from earthquakes, lightning, and all ether extraordinary phenomena of nature called portenta. The haruspices did not equal the angurs in dignity and respect; they were regarded rather as mediums of communication with heaven than as possessing any independent religious anthority. They had no organisation like the angurs; they did not, in earlier times at least, form a collegium, nor lud they a magister. Their art fell latterly into disrepute, as is illustrated by the well-known saying of Cato that 'he wondered that one haruspex did not laugh when he saw another.' See Auguries, and Divination.

Harvard University, founded as a callege in 1638, is the aldest, richest, and best equipped of the institutions of learning in the United States. It is located at Cambridge (q.v.), copyright 1800 in Us. Massachusetts, and its numerous buildings (nearly fifty) are the chief features of the town. It was named in heneur of the Rev. John Harvard, who was probably born in Southwark in 1607, graduated in 1635 at Emmanuel College, Cambridge, came to New Eugland

in 1637, and, dving in 1638, bequeathed to the proposed college his library of over 300 volumes and £779. During the colonial period the avowed object of Harvard College was 'the education of the English and Indian youth in knowledge and godliness,' mainly with a view to their entering the Puritan ministry: only one Indian ever graduated (in 1665). In its infancy the college was supported by voluntary contributions from the clintches, and by grants from the Massachusetts colony, but for a long time it was a rather obscure and feeble school. Its expansion into a university, its deliverance from sectarian control, and its apparatus. and its independence from the state have been accomplished during the 19th century. During the same period its resources have enormously increased, and almost wholly from private donations. It was mainly under the rule of the state until 1865, when by statute the government was vested in a board of thirty overseers, in six classes of five members each, thosen by the almini; one class being renewed annually. The overseers direct the courses of study and general management, but the nominations of professors and other officers are made by the 'corporation,' consisting of officers are made by the 'corporation,' consisting of the president and live fellows, a self-perpetuating body, originally created by charter in 1650, and holding all the property of the university as trustees. The nominations made by the 'corporation' require confirmation by the overseers.

The halls for 'recitations' and lectures, and for students' lodgings, as also the chapel, library, and law-school, are in a square called the college yard, containing about 13 care planted with heavy first

containing about 15 acres, planted with beautiful elms. The other buildings are in other parts of the town, not far distant, and occupy about 60 acres. The Agassiz mascum of comparative zoology is world-famous. The Peabody museum of American are the statement of the peabody museum of American are the statement of the peabody museum of the peabody mus is world-famous. The Peabody museum of American archaeology and ethnology dates from 1866; and in 1890 a sum of \$50,000 was given to found a museum of Semitic antiquities. The most imposing edifice is Memorial Hall, built in honour of the ahmmi who fell during the civil war. It is 310 feet in length, and 115 in breadth, and has a tower 200 feet high. An ample vestilmle contains busts and unral tablets. The principal hall is 164 by 60 feet, and 80 feet to the ceiling. This has a fine collection of historical partraits. This has a fine collection of historical portraits. is used as a dining-hall, and accommodates nearly 700 at table. At the eastern end is a beautiful theathe for public exercises on ceremonial occasions. Memorial Hall, built of lnick and freestone, in Norman style, richly ornamented, needs only the mellowing touch of age to be one of the most impressive collegiate buildings in the world.

In the academic department the requirements for admission are high, and as a consequence few stndents enter before the age of eighteen. choice of two lines of study, both including ancient classics, mathematics, and other sciences; but in one line the classics are prominent, in the other the sciences. There are also various minor elections of study; but no degree is given without some full course, thoroughly carried out. As the university is amply endowed, there are many scholar-ships in all the departments, besides prizes and aids of many sorts, amounting to about \$45,000 per annum. Morning prayers are conducted by clergymen of different denominations in tun; and students must attend Sunday services at the church designated by their parents. The general library contains above 250,000 volumes; and other libraries raise the total to 360,000 volumes. is a well-equipped observatory, besides a botanic garden and an arboretum. There are no fees payable to professors; each student on matriculation pays a general fee, and may attend as many courses as he elects. Expenses vary with the

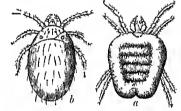
habits of the student, but necessary expenses need not exceed \$1000 (£200) per annum; with economy one can live reputably for \$800 (£160). The college

The following are the departments included in the university, with the number of students attached to each. Harvard College (1271); the Divinity School (35); the Law School (254); the Lawrence Scientific School (65); the Medical School (290); the Dental School (in Boston, 35); the Bussey Institution, a school of agriculture (2); the School of Veterinary Medicine (in Boston, 20); and the Graduate Department (with 107 resident graduates). Exclusive of 220 students of the summer course, the total number of students is thus 2079. There are 71 professors, 21 assistant-professors, and 121 other teachers, besides 44 processors and other officers. The invested funds of the univerother officers. The invested funds of the university, exclusive of lands, buildings, books, and apparatus, amounted in July 1889 to \$6,874,046, of which the annual income was \$337,532. The revenue from students' fees is not much less than \$300,000 per annum. So that the total income is considerably more than £100,000 a year.

There is a society for the collegiate instruction of women by professors and instructors of Harvard College. The students have access to the university library, and after a four years' course may obtain certificates conesponding to the B.A. degree. The society, known generally as the Harvard 'annex,' was organised in 1879, and in 1889 had 115 students. See William Rendle's monograph

on John Harvard (1885).

Harvest-bug, the larval form of the silky Trambidium (Trambidium holosericeum-Linn.) of the family Tiombidiida, order Acarina. It is of minute size, scarcely discernible by the naked eye, and of a bright scarlet or vivid crimson colour. In and of a bright scarlet or vivid crimson colour. In the hot months of summer it is found in gardens



a, Trombidium holoscriccum, female (mag. 9 diameters);
 b, larva, full grown (Harvest-bug).

and on wild vegetation, being most plentiful in hot dry seasons in places near the sea and in chalky districts. It specially torments people with delicate skins, and the wound it produces causes a good deal of local irritation and also, in warmer countries, a considerable amount of constitutional dis-The most unpleasant symptoms are turbance. only observed in climates warmer than Britain; but the mite is troublesome enough in some parts of Scotland. M. P. Megnin has investigated the lifehistory of the harvest-bug, or rouget, as it is called in France (see Annales des Sciences Naturelles, 6th series, vol. iv. 1976). He found the silky Trombidium (T. holoscriccum), a bright scarlet species, from spring till July and August, when it suddenly disappeared. In April he found some males with many young females, in the end of May and in June only gravid females. In June and July eggs were leid, which hatched producing the rouget or were laid, which hatched, producing the rouget or harvest-bug formerly described as Leptus autum-nalis, an almost spherical six-legged larva, which soon found a host into whose skin it thrust its sharp mandibles. Forthwith its abdomen began to swell with the fluid imbibed, reaching ultimately

to about five times its original bulk, the head and thorax remaining of the same size as before. After hibernation, during which it digested and assimilated the nutritive juices stored up during its parasitic existence, it became the eight-legged nympha, exclusively a vegetable feeder and sexually complete. The harvest-big infests not only liminan beings, but also dogs, eats, haves, and other smaller manimals, and even insects. The remedy employed for its bite is to extract the animal from the skin by means of a needle, and to allay the itehing by rubbing the part affected with some essential oil. The ravages of the harvest-bug appear to be not confined to Europe, since a small animal found in Mexico, and called by the Indians *Thatsahuate*, seems to be, if not identical with, at least similar to the harvest bug in its processes and effects

Harvest-fly, the popular name in the United States for a species of Cicada (q.v.).

Harvest-moon. See Moon.

Harvey, Sir George, P.R.S.A., was born at St Ninkus, near Stirling, in February 1806. He was apprenticed to a bookseller in Stirling, but in 1823 removed to Edinburgh, and entered the Trustees' Academy there. In 1826, when the Trustees' Academy there. In 1826, when the Royal Scottish Academy was instituted, he was elected an Associate, though only in his twentieth year; he became a full Academician in 1829, president in 1804, and was knighted in 1867. He died 22d January 1876. Many of his works are well known through the medium of engravings. The known through the medium of engravings. The principal are 'Covenanters' Proaching,' 'Battle of Dramelog,' 'A Highland Funorul,' 'Children blowing Bubbles in Old Greyfriars' Churchyard,' 'First Paraling of the Bible in the Court of the Bartley. ing number in Old Greyfriars' Churchyard,' 'First Rending of the Bible in the Crypt of St Panl's,' 'Bunyau in Bedford Gaol' and 'Bunyan and his Daughter selling Laces,' 'Shakespoure hefore Sir T. Lacy,' 'The Curlers,' and 'Leaving the Manse.' In his later years Harvey devoted much time to landscape-muniting.

Marvey, William, the discoverer of the circulation of the blood, was born at Folkestone, in Kent, on the 1st of April 1578. His father was a yeoman; and his brothers were merchants of weight and substance, magni et copiosi, in the weight and substance, magni et copiosi, in the city of Landon. After six years at Canterlary grammar-school, Harvey, then sixteen years of age, was entered at Cains Collego, Cambridge. He took his degree in arts in 1597, and, after live years' study at the university of Padua under Pabricius de Aquapendente, Julius Casserius, and other eminent men who then adorned that university, he obtained his diploma as doctor of medicine in 1602. He returned to England in the same year: and after receiving his doctor's degree same year; and after receiving his doctor's degree from his original university, Cambridge, settled in London as a physician. In 1609 he was appointed physician to St Burtholomew's Hospital, and in 1615 Lumlehm Lecturer at the College of Physicians an office then hold for life; and it is generally supposed that in his first course of lectures (in the spring of 1616) he expounded those original and complete views of the circulation of the blood with which his name is indelibly associated. It was not till the year 1623 that he gave his views to the world at large, in his celebrated treatise entitled Exercitatio Anatomica de Motu Cordis et Sanguinis, having then, as he states in the preface, for nine years or more gone on demonstrating the subject in his college lectures, illustrating it by new and additional arguments, and freeing it from the objections raised by the skilful amongst anatomists. He was appointed successively physician to James I. and Charles I.; and in 1633 we find that his absence, the reason of his attendance on the king's majesty. 'by reason of his attendance on the king's majesty, from St Bartholomew's Hospital was complained of, and that Dr Andrews was appointed as his sub-

stitute, 'but without prejudice to him in his yearly fee or in any other respect'—a procedure which shows the esteem in which Harvey was held. We learn from Anbrey that he accompanied Thomas Howard, Earl of Arundel, in his embassy to the emperor in 1636; and during this journey he publicly demonstrated to Caspar Hofmann, the distinehief opponents of his views, the anatomical particulars which made the circulation of the blood a necessary conclusion-a demonstration which, it is reported, was satisfactory to all present save Hot-mann himself, who still continued to urge futile objections. To appreciate the importance of Harvey's discovery and the nature of the objec-tions that would be urged against it, it is sufficient to state that Harvey's first step was to prove that the arteries contained not air but blood, whole course of the circulation could not be dewhole course of the circulation could not be demonstrated, as Harvey had no idea of a system of capillaries uniting arteries and veins. These were discovered by Malpighi some lifty years later. He attended the king in his various expeditions, and was present with him at the hattle of Edgehill (October 23, 1642). 'Unning the fight,' says Anbrey, 'the Prince and Duke of York were compitted to his own. He teld me that he with him it to the his own. mitted to his care. He told me that he withdrew mitted to his earr. He told the that he windrew with them under a hedge, and tooke out of his pockets a booke, and read. But he had not read very long before a bullet of a great gun grazed ou the ground neare him, which made him remove his station. He accompanied the king after the station.' He accompanied the king after the battle to Oxford, where he resided nearly four years, receiving the honorary degree of Doctor of Physic, and being elected warden of Merton College. On the surrender of Oxford to the Parliament in July 1646, he left the university and returned to Loudon. He was now sixty-eight years of uge, and seems to have withdrawn himself from practice and from all further participation in the fortunes of his royal master. During the in the fortunes of his royal master. During the remainder of his life he was usually the guest of one or other of his brothers, now men of wealth one or other of his brothers, now men or weath and high standing in the city; and it was at the country-house of one of them that Dr Eut visited him at Christianas 1650, and after 'many diffi-culties' obtained from him the MS. of his work on the generation of animals, which was published in the fellowing year, under the title of Exercitationes de Generatione Animalium.

From this period to the time of his death the chief object which occupied his mind was the welfare and improvement of the College of Physicians. In 1654 he was elected president of the college, but he declined the office on account of his age and infirmities. In July 1656 he resigned his Lumleian lectureship, which he had held for more than forty years; and in taking leave of the college presented to it his little patrimonial estate at Burnarsh, in Kent. He did not long survive, but, we want by reported attacks of count died at worn out by repeated attacks of gout, died at Worn out by repeated attacks of gott, dec at London on the 3d June 1657, and was buried in a vault at Hempstead, near Suffron Walden, in Essex. On 18th October 1883, at the cost of the Royal College of Physicians, his remains were removed from the dilapidated vault, and with befitting solemnity reinterred in a marble sareophagus in the Harvey Chapel attached to the

same charela.

Harvey's works in Latin were published in 1766; a translation by Dr Willis in 1847 (new ed. 1881); and his Præfectiones Academicae by a committee of the Royal College of Physicians in 1887. See Willis's Life of Harvey (1878); and Hukley's remarks at the Tercentenary colobration (Nature, 1878). A statue of Harvey was erected at Folkestone in 1881.

Harwich, a municipal borough, scaport, and market-town of Essex, is situated on a promontory

at the influx of the confluent Stour and Orwell to the sea, 71 miles by rail NE. of London. Southward of Harwich is the watering-place of Dovercourt, with a sea-wall 2 miles long. The chief industries are shipbuilding, fishing, and the manufacture of cement. Steamers run daily to Ip-wich, and there are regular lines of packets to Antwerp, Rotterdam, London, &c. The harbour is capacious, safe, and commodious, having been much improved since 1844. It is defended by a battery, and, on the Suffolk side, by Landguard Fort, which dates from the reign of James I. So great have been the encroachments made by the sea on the promontory on which Harwich stands that two jetties or groins, 1350 and 1000 feet long respectively, were undertaken in 1863 to break the force of the waves, and these have proved very successful. From the 14th century till 1867 Harwich returned two members, and from then till 1885 one. Pop. (1851) 4451; (1881) 7810.

Harz Monntains, a mountain-range of Germany, extending between the rivers Weser and Elbe, sonth of Brunswick, with a length of 57 miles, a breadth of 20, and a superficial area of 784 sq. m. It forms an elevated platean, rising on most sides somewhat steeply from the plains, and ridged with irregular and in some parts forest-clad mountains. The range, which is divided into Upper and Lower Harz, the average elevations of which are 2100 and 1000 feet respectively, is composed for the most part of rocks belonging to the Devonian and Lower Carloniferous formations, and linder through in a few places by granite, as in the Broeken (q.v.), the highest peak (3740 feet) of central Germany. The Harz are exceedingly rich in metals and minerals, as silver, iron, lead, copper, zinc, marble, alabaster, and granite. These mountains form a natural line of division between the Low German and the High German races. Industries connected with the mines and the forests, as well as some cattle-breeding and agriculture, afford employment to the inhabitants. The rearing of singing birds is also a sonree of profit. The Harz Mountains are the scenes of many of the weird legendary tales of German literature.

Hasdrubal ('he whose help is Baul'), the name of several Carthaginian generals, of whom the most famons was the son-in-law of Hamilear Barca (q.v.). In 237 B.C. he accompanied Hamilear into Spain, and gave that general most effective aid in the work of building up a Carthaginian dominion in the Peninsula. On the death of Hamilear in 228 B.C. the task of administering and extending the new empire devolved on Hasdrubal, who advanced the Carthaginian frontier from the Beetis (the Gnadalquivir) to the Tagus, and founded a new capital, Nova Carthago (the modern Cartagena), a city with the best harbour on the south-east coast of Spain, and situated in the vicinity of rich silver-mines. Hasdrubal proved himself an admirable administrator. He was remarkably successful in conciliating the Iberian tribes, and extended his rule mainly by peaceful means. So independent was he of the home government that the Romans made a treaty in which the Ebro was fixed on as the frontier line, not with Carthage, but with Hasdrubal. In the eighth year of his command, 221 B.C., he was assassinated by a Celtie slave.—Another Hasdrubal was the son of Hannilear Barca, and the brother of Hannibal (q.v.). He defeated Cheius Scipio in Spain in 212 B.C., and in 208 marched through Gaul, to join his brother Hannibal in Italy. He crossed the Alps in favourable weather, but, instead of pushing southward, made a fatal delay at Placentia, and was surprised and slain on the Metaurus in 207 B.C.—A third Hasdrubal was one of Hannibal's principal officers

in the Italian campaigns. He made a brilliant charge at the battle of Canne, which contributed greatly to decide the fate of the day.—A fourth general of the same name defended Carthage against the Romans during the siege which ended in the city's destruction in 146 B.C. He is accused of cowardiec and cruelty, and of having Starved the citizens while himself living in revelry.

Hase, Karl August van, a celebrated German theologian, was born at Steinbach, in Saxony, 25th Angust 1800. After being expelled from Erlangen University for bis connection with the political students' unions called the 'Burschenschaften,' he became in 1823 a university tutor at Tübingen, but after a new investigation was imprisoned for ten months in the fortress of Hohenasperg. He settled at Leipzig in 1829, and in the following year was called to Jena as professor of Theology. Here he remained till his retirement in 1883, when, after sixty years of teaching, he was ennobled, and appointed a privy-conneillor. His chief wittings are Des alten Pfarrers Testament (1824); Lehrbuch der Erangelischen Dognatik (1826; 6th ed. 1870); Gnosis (3 vols. 1826-28; 2d ed. 1870); Huttorus redivirus (1828; 12th ed. 1883), which was an able attempt to present dognatic theology in the form that Hinter would have chosen, had he been living in the present century, and involved him in a long controversy with Rohr, the exponent of 'vulgar-rationalism;' Das Leben Jesu (1829; 5th ed. 1865); Kirchenyeschichte (1834; 11th ed. 1886); Die beiden Erzbischöfe (1839); Neue Propheten (1851; 2d ed. 1860); a life of St Francis (1856); a handbook of Protestant polemical theology (1863); a life of St Catharine of Siena (1864); Geschichte Jesu (1876); Des Kulturkampfes Ende (1879); and lectures on church history (1885). He subsequently began the publication of a church history based on his university lectures (1885 et seq.). His antoliography down to 1830 is entitled Ideale und Irrihimer (1872; 2d ed. 1873). Hase was called the Nestor of modern scientific theology. He did great service in the reconciliation of the clurch's faith to modern thought, and was an equally resolute and effective appanent of orthodoxy on the one hand and rationalism on the other. He died 3d January 1890.

Haselrig (otherwise HESILRIGE or HAZLERIGG), SIR ARTHUR, one of the Five Members (q.v.), commanded a noted regiment of cuirassiers called the 'Lobsters' on the side of the Parliament, took an active part in the Honse of Commons in connection with the militia and other bills, and was governor of Newcastle, but in 1660 acquiesced with Monk in the Restoration. He died shortly after.

Hashish, from which the word assassin is derived, is an Arabian preparation of Indian hemp, known in India as bhang or siddhi. It consists chiefly of the leaves and stalks of Cannabis indica. The medicinal value of the preparations of Indian hemp is treated in another article; see Hemp (INDIAN). It is the physiological action which will now be specially noticed. The drug is used in the East in various ways. Sometimes it is smoked alone or with tobacco. At other times beverages are prepared from it, or it is taken in the form of lozenges or electraries. The majoon of Calcutta, the mapouchari of Cairo, and the dawames or dawames of the Arabs are preparations of this kind. The effects differ according to the dose and the idiosyncrasy of the individual. Some become pugnacious, while others fall into a state of reveric. After small doses there is a great tendency to causeless merriment. In most cases there is an extraordinary susceptibility to hallucinations of various kinds, their nature depending largely on the cast

of mind of the person, and to some extent on his surroundings. Time, distance, and sound are no louger correctly judged of. A minute may have compressed into it the action of a month, a handbreadth may stretch out to a mile, and the ripple of a brook may swell into the roar of Niagara. Although the dreams produced in Orientals by the drag are often of a voluptuous nature, this is by no means a universal effect, and among Euroby no means a universal effect, and among Europeans they have not this character. The stage of hallneination is generally succeeded by a stage of deep shunber with diminished sensibility. The unpleasant after-effects of opium seem to be absent; but the use of hashish has the inevitable demoralising effects of all such indulgences. See Morean, Du Huchisch et de l'Allienation Mentale (1845).

Haslar Hospital, to the south of Cosport (q.v.), between Haslar Lake and the sea, is an enormous establishment for the officers and men of the navy, dating from 1746, and capable of accommodating 2000 patients. The Royal Naval Chapel is also here, and beyond are the Haslar barracks.

Haslingden, a manufacturing and market town of Laneashire, 19 miles NW. of Manchester. Cotton, silk, and woollen manufactures are carried on. In the vicinity are ironworks, coal-mines, and stone and slate quarries. Pop. (1851) 6164; (1881) 14,333.

Hasmoneans. See MACCABRES.

Hassan-ben-Sabah, the 'Old Man of the Mountain' of European story, was founder of the

Moslem sect of the Assassins (q.v.).

Hasse, Johann Adolf, composer, was born at Bergedoif, near Hamburg, 25th March 1699, and studied in Italy under Porpora and Scarlatti. He became famous as Il Sassone ('the Saxon') through his opera Sesostrate, produced at Naples (1725); was kapell-meister at Dresden; and was brought to London in 1733 to head an opposition to Handel as representing the Italian school. Here Artaserse was produced with success; but Hasse soon left London, and in 1740 was in Dresden, subsequently retiring to Vienna and to Venice, where he died 23d Decomber 1783.

Hasselt, capital of the Belgian province of Limburg, situated 18 miles by rail NW. of Maastricht, has several distilleries, mumfactures linen fabries, lace, and tobacco, and cultivates tobacco, madder, and chicory. Pop. 13,194.

Mastinapur, a ruined city of India, on the old bed of the Ganges, 22 miles E. of Meernt. It was the capital of the great Pandava kingdom, frequently mentioned in the Mahabharata.

Hastings, a parliamentary and municipal borough and famous watering-place of Sassex, is picturesquely situated on the shore, and sarrounded picturesquely situated on the shore, and surrounded by high cliffs on all sides except the south, which is open to the sea. By rail it is 33 miles E. of Brighton and 62 miles SSE. of London. It con-sisted formerly of only two streets, intersected by a small stream called the Bourne, but is now a large place, whose resident population is doubled during the holiday season. Since the middle of the 19th century the borough has been greatly extended, and some portion of the hills which shelter the town contain several fine streets and terraces. The breezy and nicoly-payed esulunade. shelter the town contain several fine streets and terraces. The breezy and nicoly-paved esplanade, over 3 miles in length, forms one of the finest seawalks and drives in the kingdom. The climate is dry and agreeable, and the bathing very good. During cold weather in winter and spring the place is a commended resort for unknowney complaints, being sheltered by the hills inland from easterly and northerly winds. It is famous for the mildness, solubrity, and evenness of its climate. mildness, salubrity, and evenness of its climate,

the mean daily range of shade temperature being remarkably small (99) as compared with nearly all other stations on the south coast. It has been said to offer a choice of three climates—the mild of the sea front, the more bracing of the inland, of the sea from, the more british of the mand, and the extremely bracing and invigorating of the surrounding bills, 500 feet above the sea. The sandy soil secures a dryness of soil and atmosphere not usually to be had at seaside resorts. According to Dr Parsons, 'the bottest days in summer are eight degrees cooler than London, and, contrary to general belief, three degrees cooler than Landon, and, contrary to general belief, three degrees cooler than Eastbourne. The drainage is good, the British Medical Journal stating that 'Hustings is one of the best drained and ventilated of seaside places.' The water-supply is pure and abundant; and salt water is laid on for watering the streets, and can be supplied direct from the main to private houses for both purposes. The corporation have purchased for a considerable sum the East and West Hills, fine open plateaus communding beautiful land and sea views, and admirably adapted for golf and other outdoor sports.

The East Hill Cliffs present great interest to geologists, and are part of the property purchased. They descend sheer into the sea, and are remark-They descend sheer into the sets and he what-able for their rugged beauty as seen from the ocean. There are three large public gardens, one of them exceedingly pretty, and an exten-sive Alexandra Park, opened by the Prince and Princess of Wales in 1882. The anneaments of the place are many and varied. Hotels are plentiful, and several large and flourishing schools have been established, the Hastings centre taking a large place in the Oxford and Cambridge local examinations. One of the great attractions of the examinations. One of the great attractions of the town to visitors is the hundsome pier, extending 900 feet from the parade, and having a spacious pavilion at the sea end giving accommodation for between 2000 and 3000 persons. A similar pier was in 1890 in course of construction at 8t Leonards, about a mile westwards. The 'premier ('inque port' is the largest and richest fishing-station on the south coast. The eastle, now in ruins, was built by one of the followers of William the Conqueror. by one of the followers of William the Conqueror. Hastings (since 1885) returns only one member to parliament. Pop. of parliamentary berough (1851) 17,011; (1881) 42,258; (1890) 55,000. See W. D. Gooper's Notices of Hastings (1862); and Montagu Burrows' Cinque Ports (1888).

THE BATTLE OF HASTINGS is the usual name given to the great battle at Senlae, near Hastings, in which the English under King Harold were completely defeated by the Norman invaders under

which the English under King Pracon were com-pletely defeated by the Norman invaders under William the Conqueror, October 14, 1066. From that fatal day until now the place has borne the name of Battle (q.v.). Harold's force was drawn chiefly from the southern counties, and was firmly posted on the Hill of Senlac, fortified with a stockade and ditch. The Normans were arranged in three divisions, the centre led by the redoubtable duke in person. The Norman foot began the battle, and it is said that the minstrel Taillefer, riding in front a blow and the first to fall. The Norman foot spont their fury in vain upon the English stockade, while the Bretons on the Norman left wing were quickly put to flight. A cry now arose that the duke was slain, and panic quickly spread throughout the army. 'I live,' shouted William, as he tore off his belinet, 'and by God's help will conquer yet,' and led on his men abow to the attack. Not, however, till by a counterfeited flight he had drawn the English in eager pursuit from their strong position was he able to break their line and obtain a footing on the high ground on which they had slood so stubbornly. With the quick oye of the true soldier, William now commanded his archers to shoot high into the air that their arrows might fall from above. The English fell quickly, their shields being unable to protect their heads, and the king was soon struck down by an arrow in the right eye. The battle was now last, but the honsecarls fought where they stood till the last man was slain. See the third volume of Freeman's Norman Conquest.

Hastings, Francis Rawdon-Hastings, Mar-QUIS OF, Governor-general of India, was descended from an old Anglo-Norman family settled in County Down, Ireland, and was hom on 9th December 1754. Entering the army in 1771, he was engaged in many of the chief operations of the war of American independence, fighting at Banker Hill, in Long Island and New Jersey, at the siege of Charleston, and at the battles of Camden and Hobkirk's Hill, and attained the rank of adjutant-general under Lord Cornwallis. On his return home he was created (1783) Baron Rawdon, and afterwards became intimate with the Prince of Wales. A year after he had succeeded his father as Earl of Mona he carried (1794) an army corps of 10,000 men across to Holland, to reinforce the Duke of York; and in the following year participated in the attack on Quiberon. Under the Fox-Grenville ministry he was in 1806 appointed master-general of ord-nance; and he took an active part in politics until his appointment to the governor-generalship of India in 1813. This high office he held down to The most momentous events of his administration were the war against the brave mountaineers of Nepal, the Goorkhas, who by the peace of 1816 or vepal, the Goorkhas, who by the peace of 1816 were converted from aggressive enemies into the standenest of allies; and in the next year the was against the Pindaris and the Mahrattas, both of which were speedily brought to a successful termination, with the result that a large addition was made to the territories of the East India Company. For his masterly treatment of the Goorkha question Lord Maira was created Maranis of Hustings (1816) Lord Moira was created Marquis of Hastings (1816). His policy in India included the encouragement of native education and of the freedom of the press, a reform in the law system, and the elevation of the status of the civil service. His resignation was caused by imputations levelled against his public conduct in connection with the affairs of a banking In 1824, the year after his return home, Lord Hastings was appointed governor of Malta, and he nem this omee until his death, at Bake, near Naples, on 28th November 1826. See his Private Journal, edited by his daughter (2d ed. 1858); Prinsey's History of India during the Administration of the Marquis of Hastings (1825); and Asiatic Journal (1823). held this office until his death, at Baire, near Naples,

Hastings, Warren, was born at Churchill, in Oxfordshire, 6th December 1732. He was descended from the family of Hastings of Daylesford. But the estate had passed out of the family, and Hastings, who was early left an orphan, was educated at the expense of an uncle. He distinguished himself at Westminster School, where he was contemporary with the poets Churchill and Cowper, with the future Lord Shelburne, and with Elijah Impey (q.v.). In 1750 he went out in the Civil Service of the East India Company, and was at first employed in the secretariat in Calcutta. He was up the country at the time of the Black Hole affair, but made his escape and joined the refugees at Falta Chat, where he married his first wife; she died after bearing two children, who lived but a few years. Left a wildower, Hastings returned to England in 1764, where he spent five years and made the acquaintance of Dr Johnson. In 1769 he returned to India as second-in-council at Madras, and in 1772 proceeded to Bengal, where he was promoted to the presidency of the council. A

year later the British parliament produced the Regulating Act, under which Hastings was to be governor-general with a hand-ome salary, and was to be assisted by a council of four members, three appointed from home. This was the beginning of trouble; the majority in council led by Francis was opposed to Hastings from the first; the finances were in great disorder, the demands of the Company for remittances were frequent and ingent. One of Hastings' first tasks was to bring to trial the chief fiscal ministers of Bengal, Rája Shatáb Rai and Nawaib Muhamad Raza, on charges of malversation and embezzlement. This, though done under the colors from home proved injurious to mositive orders from home, proved injurious to Hastings' popularity. A corrupt and treacherous official, Nuncomar (Raja Nand Kumar), was employed in conducting the case; and when it broke down all three became his enemies. In 1775 Nuncomar was tried, sentenced, and executed for forgery, a proceeding which threw obloquy on Hastings and on the chief-justice, Sir Elijah Impey, which has been much dispelled in recent times. Among measures of donestic reform, Hastings made an appraisement of the landed estates which formed the assets of a great portion of the public revenue, and on that appraisement based a revised assess ment. He also improved the administration of justice in the country courts and organised the opinm revenue. In his external policy he was no less energetic and original. He waged vigorous war with the Mahrattas, and made the Company's power paramount in many parts of India. He contracted advantageous alliances and restored the financial position of the Company. All this was not done without encountering opposition and consure. In 1777 an attempt was made to depose him, on the strength of a conditional resignation which he had sent home; and the attempt was only which he had sent none; and the attempt was only frustrated by the action of the Supreme Court, of which Impey was still chief-justice. In the same year Hastings married the divoced wife of Baron Imhoff, a German officer. In 1780 he was finally freed from embarrassment by the opposition owing to the retirement of its leader, Philip Francis, whom he wounded in a duel.

At the end of 1784 he resigned office and sailed for England, where he was well received by King George III., but soon became subject to a parliamentary inquiry, with a view to impeachment. Into the details of the charges brought against him we cannot here enter. Among the chief misdeeds alleged against him were the aid that he gave to his ally the Nawib of Ondh in the war against the Rohilla Afghaus, his punishment of the Zemindar of Benares for non-compliance with a demand for aid in the first Mahratta war, and his connivance in the forfeiture of property—real and personal—which had been conferred on the Begums or dowager-princesses of Ondh. Charges on these subjects were preferred by the Whig opposition, and Hastings, being deserted by Mr Pitt, was impeached at the bar of the House of Lords. The trial began 13th February 1788 in Westminster Hall, among the managers for the Commons being Edmund Burke, Fox, Sheridan, Elliott (afterwards Lord Minto), and Mr (afterwards Earl) Grey. The early sittings were numerously attended, and the audience was rewarded by spleudid displays of rhetoric; but the public interest soon flagged. It was felt by those persons who knew or cared about the matter at all that the alleged errors of Hastings were overbalanced by great public services. He had organised the administration in all its branches; he had fostered learning; above all, he had founded an empire which no one thought of abandoning. The trial dragged itself through more than seven years and nearly 150 sittings. At last,

on the 23d April 1795, Hastings was acquitted on all the charges, unanimously on all that affected his personal honour. Out of the original members who had met in Westminster Hall when Hastings first bowed his knee at the bar but twenty-nine were left to vote for the final award; the remaining peers stood round the throne as spectators. ings left the court a rained man, the small fortune that he brought from India having been quite emsmucd in the expenses of the defence. But the Court of Directors came to his aid and made provision for his declining years. Carrying out what is said to have been an aspiration of his youth, Hastings bought the old family seat of Daylesford, in Worcestershire, where he passed the rest of his life in the occupations of a country gentleman, varied by occasional visits to London. He gave evidence before parliamentary committees, and dined at Carlton House; the prince-regent made him a privy-conneillor; and he received honours from the city and the Houses of Parliament. He died at Daylesford, 22d August 1818, his wife surviving him. In his long and active career Hastings showed constant energy, courage, judgment, and application. In his private life he was gentle and musclfish. He left no children.

The materials for Hastings' life are to be found in his Biography, by L. Trotter, and Mill's History of India, corrected by Wilson's notes. See also article in Dictionary of National Biography, and The Story of Nurcomar, by Sir J. F. Stophen; and Sir A. Lyall's Warren Hastings ('Men of Action,' 1889). Macanlay's eloquent essay

is untrustworthy.

Hastings Sands, named from Hastings in Sussex, is the lower division of the Wendon beds, forming a portion of the Lower Cretaceons series. The beds consist chiefly of sand and sandstone with subordinate layers of clay, and vary in thickness from 500 to 1000 feet. The group embraces three members which, in descending order, are as follows:

Tunbridge Wells Sand,
 Wadhurst Clay.
 Ashdown Sand.

The strata differ very little from those of the overlying Weald Clay, except in being more arenaceous. The beds have been deposited in shallow fresh water. The sand often oxhibits line specimens of ripple-marks, and the clay which separates the saud beds sometimes contains cracks that have been produced by the drying of the surface on exposure. The strata are highly fossiliferous. There are numerous saurian reptiles, including the luge ignanodon and the llying pterodactyle. The remains of several chelonians also occur. The fish mains of several ehelomans also occur. The fish belong chiefly to the ganoid or placeid orders, the most remarkable being the lepidotas, whose conical pulate teeth and thick square enunciled scales are very frequent. The shells belong to genera which inhabit fresh water, such as Puludina, Cyclas, and Unio.

Hat, the principal head-covering of the human having a brim around it. The history of the hat is having a brim around it. The history of the hat is of necessity intimately mixed up with that of head-coverings generally, the distinctions of bonnets, hats, and caps being arbitrary and subject to many variations with changing fashion (see illustrations in article FASHION). The hat, as a roomy brimmed head-covering, is the direct descendant of the petusus of the ancient Greeks, which was distinguished from the other Greek head-genr the vileus by the necessity. the other Greek head-gear, the pileus, by the possession of a brinn, useful for protecting its wearer from the rays of the sun. These Greek hats were made of felt, the material of which the head-gear of early times appears to have been principally fabricated. The use of felted hats became known in England about the period of the Norman conquest. The merehant in Chaucer's Prologue to the Canter-

bury Tales is described as having 'ou his hed a Haundrish bever hat.' About the period of Queen Elizabeth beaver felts in many shapes became common, and for three centuries thereafter fine beaver hats, mostly dyed black, formed the head-covering of the higher classes in Great Britain, But now, though felt hats are the everyday wear of the community, there is no longer such a thing as a genuine beaver hat. See BEAVER, FELT.

Hats at the present day are fashioned of an endless variety of materials, and, especially in the case of those wern by ladies, they are so diversified in form that they defy all delinition. But with all their variations three principal classes of hat-manufacture may be distinguished, comprised under the felt-hat, the silk-hat, and the straw-hat trades. In the felt-hat trade, the materials now principally employed are the fur or hair of rabbits, with smaller proportions of have, beaver, musk-rut, vieum, and camel for the finer felts; and sheep's wool for the commoner felted hats. Felt hats of inferior quality are also made with wool mixed with cotton and other vegetable libres-not in reality felted, but together the libres and to stiffen the hat body. In the felting of rabbit, have, and other fars, a 'bat' is first formed, which consists of an expanded cone of equally distributed fibres in quantity sufficient to form the desired hat. To make this but, a perforated cone of sheet copper is caused to revolve slowly over a funnel under which there is a powerful blast drawing air inwards through the holes in the copper cone. Fur is fed towards and drawn over the surface of the cone in an equal manner by the suction, and is so held in position till a sulficient quantity to form the litt is uniformly distrib-nted over it. A wet cloth is then wrapped around the muss, over which an outer cone is slipped, and the whole then dipped into an acidulated bath of not water, and by pressure the first stage of felting—nucking the but cohere—is secured. The subsequent operations are the same in making both far and woollen felts. In the felting of wool for hats the last is formed from carded wool wound diagonally in the felting of the same in the last is formed from carded wool wound diagonally in the same in the s ally round a double cone, which gives two bats. These are subjected to the usual operations of felting till a sullicient consistency of felt is obtained. The hats are thereafter roughly blocked on a mould to something of their ultimate form, then dyed, and when hard felts are to be under they are stilf-ened with a varnish of shellar. They are then shaped on a block, smoothed with sand-paper, bound, lined, and finished. The principal supply of rubbit fur for felting is obtained in France and Belgium from domestic rabbits, lundreds of millions being in these countries annually killed as articles of food and for the fur they yield.

The manufacture of silk hats as a substitute for

piled beavers was first attempted about 1810, but it was not till 1830 that silk plush hats were successfully made in France. The silk hat consists of a body and rim, usually made of two or three layers of cotton cloth saturated with varnishes, to give the fabric stillness and make it waterproof. These are fabric stillness and make it waterproof. monlded on wooden blocks according to the fashion of the day; and when the desired shape is produced the whole is carefully varnished over with lac and dammar varnish, and before dry the fine silk plush is applied with great nicety, so as to prevent the scans being perceived. It is then trimmed with silk braid on the edge of the brim, and a silken band round the junction of the body with the brim; and the lining of leather and thin silk being put in, it is counted. Otherwheat or cover had a consist of a is complete. Opera hats or crush hats consist of a covoring of merino stretched over a spiral steel frame, which by pressure flattens down, so that they can be easily carried.

The manufacture of straw hats, which forms an

entirely distinct branch of the hat trade, will be dealt with under Straw-plait (q.v.). In the United Kingdom the felt-hat trade is principally centred at Denton and other villages in the neighbourhood of Manchester. In the year 1888 there were exported from the United Kingdom 1,331,627 dozen hats of all kinds, valued at £1,252,017.

Hatch, Edwin, a learned theologian, born at Derby, 4th September 1835. He was educated at King Edward's School, Birmingham, and at Pem-King Edward's School, Birmingham, and at Pemboke College, Oxford, and took a second-class in classics in 1857. After some years of teaching as professor of Classics at Trinity College, Toronto, and rector of Quebec High School, he returned to Oxford as vice principal of St Mary Hall in 1867, a post which be held till his resignation in 1885. He was appointed rector of Purleigh, Essex, in 1883, and next year reader in Ecclesiastical History at Oxford. The Grinfield lecture-hip on the Septuagint he held from 1880 to 1884. His atticles on such heads as 'Ordination,' 'Priest,' &c., in Smith and Cheetham's Dictionary of Christian in Smith and Cheetham's Dictionary of Christian Antiquities, had already attracted wide attention, when his profoundly learned and admirably argued Bampton Lectures, in 1880, on *The Organisation of the Eurly Christian Churches*, firmly established his reputation both in England and Germany as one of the ablest and best-equipped theologians of the time. The book struck a blow at the roots of Michael Churches, and the control of the High Church claims, and proved to be more easily denounced than answered. It had the honour to be translated by Harnack. In 1888 he delivered a ourse of Hibbert Lectures on Greek Influence on Christianity. Hatch was made D.D. by Edinburgh in 1883; published in 1887 The Growth of Church Institutions, a profoundly learned book, though written in a bright and popular style; Essays in Biblical Greek in 1889; and had made considerable progress with his projected Concordance to the September 1988 of the control of the September 1988 of the September 19 tuagint when his career was cut short by untimely death, at Oxford, 10th November 1899. A collection of noble religious poetry, Towards Fields of Light (1889), and a volume of striking sermons, The God of Hope (1890), appeared posthumously, the latter with a brief biographical sketch by his brother. See Dr Sanday in the Expositor for February 1890.

Hatching. See Incubation, Poultry.

Hatchment, Achievement, or Funeral ESCUTCHEON, the arms of a deceased person within a black lozenge-shaped frame meant to be placed on the front of his house. If the deceased was unmarried or a widower or widow the whole field In the hatchment of a of the csenteheon is black.

married person only that part is black which adjoins the side of it occupied by

the arms of the de-ceased. Thus, in the

hatchment of a husband the dexter side is black, the sinister white; in that of a wife the reverse.

The old funeral escutcheon of Scotland, similarly to that of Germany, had the scize quartiers of the



Hatchment of Husband.

deceased arranged round his personal arms, and in strictness no one, unless his ancestors on every side up to four generations had armorial rights, was entitled to a funeral escutcheon. Escutcheons of this kind are now seldom seen even in Scotland. The black frame is sometimes powdered with drops to represent tears, and the skull and cross-bones at the corners are hardly out of use.

Hatfield, or Bishops Hattield, a markettown of Hertiordshire, 18 miles NNW. of London by rail. There exist a few scanty remains of the 12th-century palace, once the property of the bishops of Ely, but, together with the manor, seized by Henry VIII., and successively the residence of that king, of Edward VI. and Queen Elizabeth before their accession, and of James I. Hat. beth before their accession, and of James I. Hat-field House, the seat of the Marquis of Salisbury, was built by Sir Robert Cecil in 1611, and is a fine specimen of Jacobean architecture, rich in portraits and historical manuscripts. Pop. of parish (1851) 3862; (1881) 4059. See a fine account of its history in Brewer's English Studies (1881).

Hatfield Chase, a fenny tract of land in the West Riding of Yorkshire, lying between the Trent and Doncaster, some 180,000 acres in extent, which has been drained, and is now cultivated. See The Level of Hatfield Chace, by John Tomlinson (1882).

Hatherley, Sir William Page Wood, Baron, Lord Chancellor of Great Britain, was born in London in 1801, and educated at Winchester, and Trinity College, Cambridge, and subsequently called to the bar. He was returned in 1847 as Liberal member for Oxford, in 1851 was appointed the control of the bar and brighted in 1853 became solicitor-general and knighted, in 1853 became vice-chancellor, in 1868 a lord justice in the Appeal Court and lord chancellor, being at the Appeal Court and lord enuncirior, being at the same time ruised to the peerage as Baron Hatherley. His name is associated with a Bankruptcy Act of 1869. He resigned office in 1872 in consequence of failing eyesight, and died on 10th July 1881. From his pen came Truth und its Counterfeits (1857) and The Continuity of Scripture (1867-69). See Memoir by W. R. W. Stephens (1882).

Hathor, the name of an Egyptian goddess, ranked among the second class of deities, who was the daughter of Ra, the sun. See Egypt.

Hathras, a well-built town of India, in the North-west Provinces, 21 miles S. of Aligarh. It is the commercial centre for the Upper Doab, and has a large export trade in sugar, grain, cotton, oilseeds, and ghi, and imports from and metal-wares, cloth, &c. The delicate carved work of the town is famous. Pop. 25,656.

Hátim et-Ta'í was chief of the Arabian tribe of Tai, and flourished shortly before the advent of Mohammed. He was renowned for his extraordinary liberality, and his name is at the present day synonymous throughout the Moslem world with all that is open-handed and generons. No greater compliment, indeed, can be paid to an Asiatic prince or noble than to style him 'a second Hatim.' Many anecdotes of his liberality and magnanimity are recounted by poets; thus Sa'di says: 'Hatim Ta' no longer exists, but his exalted name will remain famous for virtue to eternity. Distribute a tithe of your wealth in alms, for when the husbandman lops off the exuberant branches from the vine it produces an increase of grapes. See Clouston's Group of Eastern Romances (1889).

Hatteras, CAPE, a low point of North Carolina, forming part of a sandbank, in 35° 15′ N. lat. and 75° 31′ W. long. The coast-line here turns from the direction of north-east to that of due north; violent storms are frequent and render navigation dangerous, and the island is marked by a light raised 190 feet above the sea.

Hatti Sherif. See Firmân.

Hatto, the name of two archbishops of Mainz, who have a somewhat conspicuous place in the history of Germany. The first of these was chosen Archbishop of Mainz in 891, and died in 913. - The second archbishop of that name was a monk of the monastery of Fulda, and succeeded the celebrated Rabanus Manrus, well known in the history of the encharistic controversies, as abbot of the monastery of St Boniface, about the year 942. In the second expedition of the Emperor Otho I, into Italy in 961 Hatto was sent as his umbassador from Pavia to Rome; and after his return, on the death of Archbishop William, he was ruised to the see of Mainz, and continued one of the chief directors of the imperial counsels. Of his after-life and of his personal character the most opposite accounts have been given. By some he is represented as a zealous reformer, and an upright and successful administrator; by others as a selfish and hard-hearted oppressor of the poor; and the strange legend of his boing devoured by rats, which Southey has perpetuated in his well-known ballad, is represented as an evidence of the estimate that was popularly formed regarding him. It is by no means imprabable, however, that this legend is of a much later date, and that its real origin is to be traced to the equivocal designation of the tower on the Rhine, Maüsethurm, near Bingen, which has been selected as the scene of the ocenrence. Mauschurm, 'Mouse-tower,' is possibly only a carrupted form of Mauth-thurm, 'Toll-tower,' a sofficiently descriptive name; but the modified form of the word might readily suggest a legend of mice or rats. Another etymology is from museria, an old word for ord-nance. The date at which the Mansethurm was huilt is unknown, and it is far from certain that it is not much later than the time of Hatto. was stormed by the Swedes in 1635. Archbishop Hatto died in 969 or 970. See Baring Gonld, Curious Myths of the Middle Ages (1869), and Max Beleim, Die Micusethurm-sage (1888).

Hatton, John Littrot, a self-educated musical composer, was born at Liverpool in 1809, and, settling in Lendon in 1832, soon made his name known as a composer. Shortly after 1848 he hecame unusical director of the Princess's Theatre. He composed numerous operas, cantatas, overtures, entractes, &c., but is remembered chiefly for his unsical settings of English songs, such as 'Gondbye, Sweetheart,' 'The Tar's Song,' 'When Evening's Twitight,' 'The Bait,' 'To Anthea,' &c. He died at Margate on 20th September 1886.

Hatzfeld (Hung. Zsombolya), a town of Hungary, 20 miles by rail W. of Temesvar. Pop. 8621.

Hauberk. See Armour.

Hanch, Hans Carsten, Danish poet, was born at Frederikshald, in Norway, 12th May 1790. His first attempts in literature being musuccessful, ho hegan to study natural history; but in 1846 was appointed to the chair of Northern Literature in the university of Kiel. Two years later the Holstein revolution drove him back to Copenhagen; and on the death of his friend Oehlenschläger, in 1850, ho succeeded him in the chair of Asthetics at the university there, and held it down to his death, at Rome, 4th March 1872. Hunch's viper and more successful works embrace nino historical tragedies, all written between 1828 and 1850, in which he exhibits great powers of individualising character and portraying the local colouring of his scenes; Lyriske Digte (1842, 1862, and 1869), some of which are extremely heautiful, and enjoy an undisputed popularity in Denmark; and many tales and romances, &c. His enic-dramatic poem Humadry-aden (1830) met with warm appreciation in Germany. At Copenhagen there appeared in 1873-75 Hauch's Samlede Romaner og Fortillinger.

Hauff, Willielm, German writer, was born at Stuttgart, 29th Nevember 1802, and was educated at Tübingen. He acted for a couple of years as private tutor, and had been editor of the Morgen-

blatt for about three-quarters of a year when he died, 18th November 1827. Although only twenty-five at the time of his death, Hauff has left behind him works which have taken a permanent place in German literature; he has even become well known of late years, through several translations and editions of his best books, in Great Britain. This reputation is due to his Marchen or fairy-tales (1826-28) and his Tutes (1828), all alike admirable for their freshness, simplicity, and playful faney. Two of the latter, Die Bettlerin vom Pont des Arts and Das Bild des Keisers, may be regarded as his masterpieces. The greatest effort of his playful fancy was, however, the exhilarating Phantasian in Brown Rathsketler (1827). Some of his poems, of which he only wrote a few, have become rolkstieder. All these works were but short; his longest productions were none of them so successful. The romance of Lichtenstein (1826), although popular in Germany, owing to its local fidelity and its being almost the first historical navel written in German in Sir Walter Scott's style, reveals several defects when tested as a work of art. His earliest lengthy work, Memoiren des Satans (1826-27), is an incomplete and immature production, but full of promise as an example of satiric humour. In the same vein Hanff wrote a parody of Clauren in Der Mann im Monde (1826), and an earnest satire against him in Kontroverspredigt (1826). His Sammtlicke Werke were published by G. Schwab in 5 vols. in 1830 (18th ed. 1882).

Hang, Martin, Sanskritist, born 30th January 1826, near Balingon, in Würtemberg, was professor at Pouna from 1859 to 1866, and at Munich from 1868 till his death, 3d June 1876. He wrote on the Pehlevi language, and on the Rig-veda, and Essays on the Sacred Language, Writings, and Religion of the Parsecs (1862).

Hanksbee. See HAWKSBEE. Hanlbowline. See CORK.

Haunted Houses in former times were very common in every corner of England and Scotland, and many persistent traditions descended of unquiet spirits who were doomed to haunt for ever the spot on which they had wrought or suffered some deed of bload. Dim shadows of earthly forms, they continued into their ghostly existence the form and aspect that they were in life, and the gaping and bleeding wounds of nurder froze the heart of the beholder from age to age. Shrioks, wailings, wringing of the lands, knockings, infernal cuses and blasphemics—such were some of the accessory horrors that the popular imagination cast around these ghostly creations, of whom many continued to possess, but in intensified form, all the power and disposition to evil which had belonged to them in These unquiet spirits could sometimes be laid, or compelled to rest finally in their graves, or the Red Sen, by the exercitations of clergymen of pre-eminent piety, who often contrived to exorcise them by passing a night of severe religious exercises alone in the hamited chamber or house. The inevitable declino of belief in the supernatural has swept away almost all our donestic ghosts, spite of the especial proneness of the popular imagination to this kind of belief. Of the haunted houses of Scotland, past or present, none are more famons than Glamis Castle, Cortachy Castle, and Spedlins Tower; no local ghosts were more persistent than those that haunted Newton Castle, Iuntingtowor, Allanbank, Wuodhanselee, and Finhaven. In England, among the most striking cases are Corby Castle with its 'radiant boy,' Peel Castle with its 'Mauthe Dog,' Ashley Hall, Skipsea Castle, Hilton Castle with its 'Cauld Lad,' Holland House, Rainham Hall with its 'Gray Lady,' Tharston Hall, Newstead Abbey, Powis Castle, and Caistor Castle, round the courtyard of which drives every year a ghostly carriage drawn by four headless horses. No less rich in stories of haunted houses are Ireland, Wales, Brittany, and Germany, and no stories of this class are more weird und gruesome than the examples in the folklore of Russia. Spectral animals as well as men and strange lights were seen at some places, and there are anthentic stories of undignified apparitions of whose presence mortals were made aware by their sense of smell. The 'Shuck Dog' of Norfolk is of large size and black colour, with great yellow eyes, and brings sure death to any one he meets. Sometimes, however, he is headless, or with but one blazing eye in the centre of his forehead. Indeed, the whole subject of spectral apparitions opens up a large chapter in popular demonology, which has been somewhat grotesquely overlaid with the theological conception of the devil.

Countless stories, old and new, are told of spirits that have at various times intested houses to the terror of their earthly inmates. Of these classical examples are those connected with Tedworth, testified to by Joseph Glanvill, and with Epworth Rectory, on the still less impeachable evidence of John Wesley. An interesting modern example of how stories of this kind can be manufactured even in our day, out of hearsay and third-hand statements, is that of the hannted house in Berkeley Square, which seems to have received its popularity and fame from being identified through some accidental circumstances as the scene of a similar story related in Temple Bar for 1868 by Rhoda Bronghton of a house in the country. Those who are sufficiently interested can follow the growth, if not the actual genesis, of the story in a series of communications to Notes and Queries, sixth

series, vols. ii. aud iii.

See the article APPARITIONS and the books enumerated there; and particularly John H. Ingram's Haunted Homes of Great Britain (1884), and the Proceedings of the Society for Psychical Research, instituted in 1882.

Haupt, Moritz, a Germanist and classical scholar, was born at Zittau, 27th July 1808, was professor at Leipzig from 1843 to 1850, and from 1853 in Berlin. He was secretary to the academy there, and died 5th February 1874. He edited several Latin classics (Ovid, Horace, &c.), and many Middle High German poems.

Haupur, a town of India, in the North-west Provinces, 18 miles S. of Meernt. The western portion is substantially built, the streets metalled and drained; the eastern half rescubles a large agricultural village, full of cattle. A famous government stud was formerly maintained here. Pop. (1872) 14,544; (1881) 13,212.

Hauran (anc. Auranitis), a district in Syria, lying to the east of the Sea of Galilee, and of the district of Jaulan (Gaulonitis), and extending to the Jebel-Hauran; but the name is sometimes restricted to a limited area in that region, a fertile and well-watered plain. See Bashan. See C. E. Schumacher, Across the Jordan, an Exploration and Survey of Part of Hauran (1886).

Hauser, Kaspar, a German youth, whose history, enshrouded in many elements of mystery, excited the attention of all Europe and especially of Germany. On the afternoon of 26th May 1828 a citizen of Nuremberg observed a youth, apparently about sixteen or seventeen years of age, dressed as a peasant, leaning against a wall in the market-place, and evidently in distress. But he was unable to give any account of himself; he could only utter, parrot-like, a few incoherent words, to the effect that he wanted to be a cavalry soldier. In his hand he bore a letter addressed to an officer in the town. The letter purported to be

written by an illiterate workman, who said that the boy had been deposited at his door an infant by some one unknown, and that he had brought him up, but in strict seclusion. Enclosed in the letter was another, pretending to have been penned by the mother of the youth, but written by the same hand and at the same time, stating that she, a poor girl, had given birth to a babe on 30th April 1812, that his name was Kaspar, and that his father, then dead, had been a soldier. The youth's mind was totally blank, not from idiotey, but because he had had no education whatever, and he was utterly ignorant of the commonest experiences of everyday life. His behaviour was that of a little child. He loathed all food except bread and water. The sounds, sights, and odours of the common world about him all cansed him great pain. His senses were altogether unused to them, or rather they were such only as would be found in one who had lived without using them, or had lived as he had done in a state of complete darkness and

complete solitude. Some time afterwards, when his senses and his mind began to be schooled, he was able to give the following account of his former existence. As long as he could remember be had been in a hole or cage, too small for him to rest in any other posture than seated on the ground with his legs stretched straight out before him. His only clothing had been a pair of tronsers and a shirt. He had never seen the snn nor heard sound of the other words. shirt. He had never seen the snn nor heard sound of the onter world. Food—bread and water—was always supplied to him whilst he slept, and sometimes he was made to sleep by 'nasty stufl' (landamun) put in the water. He had spent his time playing with two toy horses. He was attended to by 'a man,' who at last taught him to write a little, and to stand and to walk; and finally 'the man' had put shoes on his feet and had brought him to Nuremberg by night, and, placing the letter in his hand, had disappeared. The town authorities eventually decided to adopt this strange and forlorn being thus mysteriously brought to them. forlarn being thus mysteriously brought to them. But about lifteen months later, on 17th October 1829, he was found bleeding from a wound in the forehead, which, he said, had been inflicted by 'the man.' But this individual could not be found, nor even any trace of him. Meanwhile attempts were being made to educate the untutored youth, and to civilise him. At first he showed a keen thirst for knowledge, marvellons powers of memory, and wonderful quickness in apprehension; but as his body began to grow rapidly, his mind, which had apparently been early checked in its growth, soon reached the full measure of its expansion and development. Crowds of the curious had at first flocked to see the strange boy, and visitors to the city still came to visit him. Amongst these was the eccentric Lord Stanhope, who conceived a sudden fancy for Kaspar and adopted him, sending him to Ansbach to be educated. But, as his mental development had suffered an arrest, so now his moral character began to deteriorate; and he his moral character began to deteriorate; and he was being gradually forgotten, when on 14th December 1833 he saidenly burst into the house, bleeding from a wound in his side, which he said had been dealt him by 'the man,' who on this occasion too could not be discovered. Three days later Kaspar Hauser died. Beyond these facts nothing more is known about him. Owing to the many inconsistencies in his story and the mystery surrounding him, many have regarded him as an art-ful impostor, and believe that he died an involun-tary suicide. Others, again, looked upon him as the victim of a hideous crime, and believed that he was of noble birth, some indeed (since 1834) making him out to have been heir to the throne of Baden. But in 1875 the government of Baden

disproved the imputation by documentary evidence. See a first-rate study in Quarterly Review (1888).

Haussa, or Houssa, a people of the Soudan, who have been conquered by the Fulbé, and now constitute the larger part of the population in Sokoto, Adamawa, and Gando (q.v.). Whether they are of pure Negro race, or an immigrant wave of ancient Hamitic stock, now indistinguishable from the Negroes, is not yet fully determined. Their language is allied in its grammatical forms with the Hamitic tongues to the cest and north, whilst its vocabulary resembles in many points that of the neighbouring Negro tribes. At anyrate the Hanssa language is the common medium of communication in the commercial world of central Soudan. The Haussa themselves with agiculture and industrial pursuits (weaving, dyeing, taming, &c., and the making of baskets, pottery, and iron implements). They have adopted Islam from their conquerors. A force of about 1000 of them are employed as armed constabulary in the Cold Coast colonies of Great Britain. See Burth, Travels in Central Africa, vol. ii. (1837), and Staudinger, Im Herzen der Haussa-Länder (1889).

Haussmann, George Eugene, who as prefect of the Seine did so much for the improvement and ombellishment of Paris between 1853 and 1870, was born in that city on 27th March 1809. Entering the public service under Louis-Philippe, he distinguished himself in various parts of France, and under Napoloon III. rose to be prefect of the Seine (1853). Then it was that he began his task of improving the antward appearance of Paris by widening streets, laying out bunlevands and parks, building sewers, barracks, bridges, and similar public works. For these great services he was made haron and senator. But the heavy financial hurdens (235,000,000) which these improvements laid upon the citizens was the cause of Haussmann's dismissal from office in 1870. In the following year he was, however, appointed director of the Crédit Mobilier, and in 1881 was elected a member of the Chamber of Deputies. Haussmanning' has become a term for the reckles destruction of ancient huidings to make way for new streets. See his Mémoires by Havard (4 vols. 1890 et seq.).

Hautbois. See Oroe.

Haute Garonne, &c. See (Laronne (Haute), &c.

Haity, René Just, a French mineralogist, was born at St Just, department Oise, 28th February 1743, studied for the church, and took priest's orders. His attention was first turned to hotany, and it was not until middle life that he commonced the study of mineralogy. He is the discoverer of the geometrical law of crystallisation, and he also considerably enriched our knowledge of pyro-electricity. After occupying several important posts, such as commissioner of weights and measures, curator of the eabinet of mines, and professor of mineralogy, he died on 3d July 1822. His most important works, besides an essay on crystals and a treatise on electricity, are Traité de Minéralogio (2 vols. 1803), Traité des Caractères Physiques des Pierres Précieuses (1817), and Traité de Cristallographie (2 vols. 1822).—His brother Valentin Haüty (1745–1822) devoted his life to the education des Aveugles (1786).

Hauyne, a rock-forming mineral, having approximately the same composition as Noscan. The two are probably only varieties of one and the same mineral. They are anhydrous silicates of

alumina and soda, or alumina and lime, with sodium and calcium sulphate. They crystallise in isometric forms, and have a hardness = 5-5.5, and a specific gravity = 2.2-2.5. Hanyne is usually bright blue to bluish-green, while Nosean is generally gray, but sometimes greenish or even dark brown. They are essentially of volcanic origin, occurring as constituents of many recent lavas.

Havana, or Havannah (properly 'Sun Christobal de la Habana'), capital of the Spanish island of Cuba, and the principal centre of commerce in the West Indies, is situated on the north side of the island. Access is obtained to its magnificent wellsholtered harbour by a channel 350 yards wide, the entrance to which is defended by several forts. The streets of the older part of the town, which until 1863 was enclosed within walls, are narrow and dirty, and the harbour has been for generations and dirty, and the harbour has been for generations polluted by the town sewage. With this older part the more modern portion lying to the west is connected by broad tree-shaded avenues and gardens. The houses, which are low, are solidly built of stone, have flat roofs, verandas, and barred windows reaching down to the ground, and are gay with paint and white marble decorations. The most noteworthy of the public buildings are the cathedral. built in the old Spanish style in 1724, and containing the bones of Columbus (q.v.); and the hespital 'Beneficencia,' which contains an orphan asylum, a lumetic asylum, and a poorhouse in addition to its infirmary. The public institutions include an arsenal, a botanical garden, a university (with about 300 students), a cadet school, a technical school, and some fine theatres. It is the scat of the governor of the island and of a bishop, fever is prevalent during the summer months. The population in 1887 was 198,721. The staple industry of the place is the manufacture of cigars, as sugar and tobacco are the staple products grown and the most important of the exports (tobacco in 1888 to the value of £3,717,477; sugar, £1,954,003). Molasses, rum, wax, and honey are also exported. The chief imports are rice, lard, flour, jorked heef, cod-fish, and coal. The United States take 90 per cent. of the exports, bring 20 per cent. of the imports, and provide vessels for one-third of the carrying trade. Another third of the vessels that enter Havana lly the Spanish flag, and the remaining third is divided between Holland, Great Britain, and France. Havana was originally founded on the court near the weder. ally founded on the south coast, near the medern Baracon, by Diego Velasquez in 1515, but four years later was transferred to its present site. In the course of its unfortunate history it was burned to the ground by luccaneers in 1528, plundered by another band in 1555, and captured by a third in 1562. In the Track is 1556. In the 1563, and again by the English in 1762. In the 17th century, however, it was made the chief emporium of Spanish trade in the West Indies and the point of rendezvous for the Spanish gold fleets.

Havant, a market-town of Hampshire, 8 miles NE. of Portsmouth. Tanning and matting are the chief industries. Pop. of parish, 3032.

Havas Agency, an organisation in Paris, founded by a rich merchant, Charles Havas, in the reign of Louis-Philippe, for the purpose of gathering telegraphic nows and supplying it to newspapers. It was in 1879 converted into a company.

Havel, a tributary of the Elbe, which has its origin in a small lake in Mecklenburg, flows southward past Spandau to Potsdam, and thence west to Brandenburg, and finally north-west to its junction with the Elbe, opposite the town of Werben. It passes through several lakes and canals on its way. Its entire length is 220 miles; it is navigable to within 15 miles of its source; its drainage basin measures 10,160 sq. m. Its most

notable tributary is the Spree, on which Berlin stands.

Havelock, SIR HENRY, one of the heroes of the Indian mutiny, was born April 5, 1795, at Bishop-Wearmonth, in Durham, where his father was a merchant and shipbuilder. He was educated at the Charterhouse, and was at first intended for the law, but, following his elder brother's example, entered the army a month after Waterloo, and went out to India in 1823. It was during the voyage that that conversion occurred which coloured all his afterlife. Havelock distinguished himself in the Afghan and Sikh wais, but was still a lieutenant after 23 years service. In 1856 he commanded a division of the army that invaded Persia. News of the Indian mutiny hastened his return to Calcutta, and ere long he had organised a small movable column at Allahabad with which to push on to the relief of the British at Cawnpore and Lucknow. A forced march brought his 2000 men to Fatchpar, where he engaged and broke the rebels. He continued his march npon Cawnpore, driving the enemy before him. The cowardly miscreants at the suggestion of the infamons Nana Sahib revenged their defeats before abandoning Campore by the atrocious massacre of all the European women and children in their hands. At Alirwa Havelock dehildren in their hands. At Ahirwa Havelock found the robels strongly entended, but turned their left, and carried the village hy a splendid charge of the 78th Highlanders. He now entered Campore, and saw with his own eyes the horrors of the massacre. The sight steeled the hearts of his handful of heroes, who quitted Campore to his handral or heroes, who quitted champer to advance upon Lucknow. Crossing the Ganges, he repulsed the rebels at Unao, but after fighting eight victorious battles he found his little army so thinned by fatigue and sickness that he was reluctantly compelled to retire upon Campore. Early in September General Outran arrived with reinforcements and Handels are all allowed to the forcements, and Havelock again advanced to the relief of Lucknow; Outrum, with a chivalrons generosity characteristic of that heroic time, waiving his superior rank, and serving under Havelock as a volunteer until Lucknow was saved. The relieving force, which mustered 2500 men and 17 guus, after a sharp brush with the enemy engaged them at the Alum Bagh, an isolated building about three miles from the Residency of Lucknow. Next with desperate bravery they faught their way through streets of houses, each a separate fortress, until they gained the Residency, to the indescribable joy of the beleaguered garrison. The victorions army were now in turn besieged, but held their own until November, when Sir Colin Campbell in his turn forced his way to their resone. After the relief of Lucknow Havelock was attacked by dysentery, died November 22, 1857, and was buried in the Alum-Bagh. Before his death news arrived of his elevation to the distinction of K.C.B. Other honours were in store for him, but they came too He was made major general; appointed to the colonelcy of the 3d Foot, and a baronet, with a proposed pension of £1000 a year. The rank and the pension were given to his widow, daughter of the Baptist missionary, Dr Marshman; a new patent of haronetcy issued in favour of the eldest son, as his father's was sealed only the day after his death; and a statue was erected by public subscription in Trafalgar Square. Havelock was strict in his religion, and severe in his discipline, somewhat after the type of the grave and fearless Puritans who fought and conquered under Gromwell. 'For more than forty years,' he said to Sir James Outram in his last moments, 'I have so ruled my life that when death came I might face it without fear.' This he did, and among her noblest soldiers England will never cease to remember the Christian hero, Sir Henry Havelock.

See the Biographical Sketch by W. Brock (1858), and the Memoirs by J. C. Marshman (1860).

Havelok the Dane. See the article on ENGLISH LITERATURE, Vol. IV. p. 367, and the edition of the romance by Professor Skeat (Early English Text Society, Extra Series, 1868).

Haven. See HARBOUR.

Haver, a term used in Scotch law to denote the person in whose custody a document is.

Haverfordwest (Welsh Hwlffordd), a parliamentary and numicipal borough, seaport, and market-town of Wales, capital of the county of Pembroke, and a county of itself, occupies a picture-que situation on the river Cleddan, 10 miles NNE. of Milford by rail and 162 W. of Gloncester. A body of Plemings was settled in the district by Henry I. in 1107. The castle, the keep of which is naw used as the county gaol, was erected by Gilbert de Clare, first Earl of Pembroke, in the 14th century. There are also remains of a 12th-century Augustinian priory. Paper-making is the chief industry. Since 1885 Haverfordwest has been included in the Pembroke boroughs, which return one member to the House of Commons. Pop. (1861) 7019; (1881) 6398.

Havergal, Figures 1110 Lev, a popular hymnwriter, youngest child of Rev. W. H. Havergal, unsical composer, and hon, canon of Worcester eathedral, was born 14th December 1836 at Astley, Worcestershire. A talented child, she familiarised herself with modern languages, tried Greek and Hebrew, and, developing her poetical gift, she gave utterance from time to time to many sweet and delicate religious strains of song. Her writings in poetry and proce have been popular with the religions public. Some of her hymns have found their way into church collections. She issued many such volumes as Ministry of Song, Under the Surface, &c. She died at Caswell Bay, Swansea, 3d June 1879. Her collected Poetical Works appeared in 1884, and her Letters, &c. in 1885. See Memorials of Frances Ridley Havergal (1880).

Haverhill, an ancient market-town in the south-west corner of Suffolk, 18 miles SE. of Cambridge. Pop. of parish, 3685.

Haverhill, a city of Massachusetts, at the head of navigation on the Merrinae River, 33 miles N. of Boston by rail. Its chief industry is the manufacture of boots and shoes, which employs about 6000 men in 200 factories; and there are manufactures also of iron, hats, glass, &c. Pop. (1870) 13,092; (1885) 21,795.

Havers, Cloryon, anatomist and physician, who, after studying at Cambridge and Uttecht, where he graduated, settled in London in 1687. His Ostcologia Nova, or Some New Observations of the Bones and the Parts belonging to them (Lond. 1691), was long a standard work; and his name is perpetuated as the discoverer of the Haversian canals in Bone (q.v.). Other details of his life are not known.

Havildar, the highest rank of non-commissioned officer among native troops in India and Ceylon.

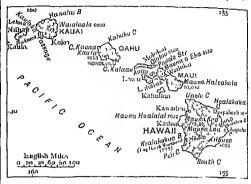
Havre, Le (a contraction of the original name, Le Havre de Notre Dame de Grâce), a seaport in the French department of Seine-Inférieure, and, next to Marseilles, the chief commorcial emporium of the country, is situated on the north side of the estuary of the Seine, 143 miles NW. of Paris hy rail. The port was entered in 1886 by 2580 vessels of 2,03,983 tons, and in 1888 by 2717 vessels of 2,341,023 tons, of which 1210 vessels of 825,892 tons were British and 645 vessels of 779,237 tons were French. These figures are

exclusive of 3112 (French) vessels of 379,777 tons and 3456 of 532,911 tons, in 1886 and 1888 respectively, engaged in the coasting trade. The chief imports are coals, wheat, cotton, dyewoods, coffee, miports are coals, wheat, cotton, dyewoods, coree, hides, petroleum, wool, palm-oil, alcohol, cocoa, and sugar. The exports consist principally of woollen and cotton goods, potatoes, salt, butter, paper, silks and ribbons, china-ware, eggs, and ochie, in addition to I_2^{\dagger} million gallons of wine and nearly £280,000 worth of millinery. The enstons duties levied amounted to £2,125,696 in Havie possesses excellent harbour accomnadation, having nine separate dack basins (the ninth completed in 1887), with an area of 174 acres and 36,400 feet of quays. The part is very greatly handicapped in the struggle for commercial success by the paneity of railway connection and the height of the harbon dues. But the greatest drawback is the difficult approach to the harbonr from the sea, owing to the shifting sandbanks that his in the structure of the shifting sandbanks that lie in the estuary. A very comprehensive scheme for improving the harbour and its approaches, and the lower course of the Seine, was put forand the lower course of the Seine, was just for-ward in 1889. It embraced the construction of a capacious outer harbour, protected by break-waters, and provided with a new entrance from deep water, the building of protective dykes in the estuary, and very extensive dredging opera-tions for the purpose of deepening the Seine up to tants for the pulpose of deepening the sente up to Rouen. Meanwhile dredging is going on on a large scale just outside the harbour. Two new dry-docks were opened in 1889. Havre does not possess a fishing fleet. It is one of the chief ports in France from which emigrants set sail. The average of 30,000 rose in 1888 to 38,000, nearly one-third being French, with about the same number of Italians and one-fifth Swiss. Two-thirds were bound to the United States the west thirds were bound to the United States, the rest for the Argentine Republic. Amongst the local industries the first place is occupied by shipbhilding. Next come machine-factories, cannonfoundries, flour-mills, petrolemm and sugar re-fineries, and dyc-works. Havre has a hydrographical, an industrial, and a commercial school, an influential chamber of commerce, and a tribunal of commerce. Its notable buildings include the 16th-century church of Notro Dame, a museum, a Renaissance town-house, a marine arsenal, &c.
There are statues to Bernardin de St Pierre and
Casimir Delayigne, both natives of Havre. The sanitary condition of the town is not so good as it should be. Nevertheless Havre is visited for its sea-bathing. Pop. (1876) 85,407; (1886) 114,949. Down to 1516 Havre was only a fishing-village.

Down to 1516 Havre was only a fishing-village. Its history as a sequent dates from the reign of Francis I., who built the harbour and fortified it. Havre was held for some months in 1562 by the English, who were expedded by Charles IX. after a hot siege. Louis XIV. made it a strong citadel, and it was several times bombarded by the English in the 17th and 18th centuries. The town walls were demolished in the middle of the 19th century. Mdlle. de Scudéry was born at Havre. See histories by Morlent (1825) and Borely (1883).

Hawaii, Hawahan Islambs, or Sandwich Islambs, a small archipelago in the North Pacific, forming the kingdom of Hawaii (so called from Hawaii, the chief island of the group), and named Sandwich Islands by Captain Cook after Lord Sandwich, who was at that time First Lord of the Admiralty. The islands, twelve in number, form a rich, beautiful, and interesting chain which runs from south-east to north-west, and lies in 19° to 22° N. lat. and 155° to 160° W. long. Their total area is about 7000 sq. m., or about that of Wales. The names and areas of the eight principal islands (the other four being merely barren rocks) are as follows: Hawaii (the 'Owhyhee' of

('aptain Cook), 4210 sq. m.; Mani, 760; Oalm, 600; Kanai, 590; Molokai (the 'Lepers' Island'), 270; Lanai, 150; Kahulani, 63; Niihau, 97.



Hawaii is the southermost of the group; it is in shape a rough triangle, with the apex pointing north-west.

Geography, Mountains, Rivers, &c.—The Ha-waiian Islands are situated on the course of ships passing from San Francisco and Vancouver Island to China and Japan, as well as to New Zealand and Australia. They lie in mid-occan, between the coasts of Asia and America, but are nearer to the American coast, from which they are about 2100 miles distant; they consequently form a convenient station for the coaling and repairing of vessels on their way across the Pacific. The intended are of velocitie origin with coal large islands are of volcanic origin, with coral-neefs partly lining most of them, but entirely encircling none. They suffer from want of good harbous, the best being the barbour of Honolula, steased on the island of Oalm, with 224 feet of water in its shallowest parts. This harbour, which is entered through a narrow channel in the reef, is the only really well-protected harbour in the group; during the time of the trade-winds, however, which blow from north east to south-west for about nine blow from north-east to south-west for about nine months in the year, the roadsteads on the south shores of the islands afford safe anchorage almost anywhere. The larger islands are mountainons, and contain some of the largest volcances, both active and extinct, in the world. The two highest mountains, Mauna-Kea and Manna-Loa, are in the island of Hawaii, and are 13,805 and 13,675 feet high respectively. This island is also traversed by other mountains, which give it a nugged and picturesque appearance, and in places bold cliffs from 1000 to 3000 feet high front the sea. Speaking generally, however, the high ground in each from 1000 to 3000 feet high front the sea. Speaking generally, however, the high ground in each of the islands is in the centre, and the mountains are divided by rich valleys leading down to a sandy shore. On the eastern slape of Mauna-Loa, in Hawaii, is the far-famed Kilanca, the largest active volcano in the world. It is over 4000 feet above sea-level. Its crater is of oval shape, 9 miles in circumference, bounded by a range of miles in circumference, bounded by a range of cliffs, and containing within it a fiery lake of molten lava rising and falling like the waves of the sea. Manna-Loa itself is an active volcano, the see. Mattha Loa then is an active viscous, assected of various emptions, notably of one in February 1877, when the place emised by the flery outburst is said to have been pluinly visible on the island of Mani, 80 miles distant. On Mani is the crater of Halenkula ('house of the sm'), by far the largest known in the world. It is from 25 to 30 miles in circumference, from 2000 to 3000 feet deep, and is 10,032 feet above sealevel. Within this lugo gulf are about sixteen basins of old volcanoes, whose ridges form con-centric circles. Several of the islands, especially Hawaii and Kanai, are well supplied with rivers.

These afford great facilities for irrigation, but owing to the small size and the conformation of the islands they are in no case navigable.

Climate, Soil, &c.—Lying as they do in the middle of the Pacific Ocean, the Hawaiian Islands, though within the tropics, enjoy a fairly temperate climate. In the hot season the temperature seldon iises above 90° F., while in the cool season it seldom fulls below 52° F., the average temperature for the year being 74.3° F. Rains, brought by the north-east trade-wind, are frequent on the side of the mountains which faces that quarter, but on the other parts of the islands little nain falls, and the sky is generally cloudless. The yearly rainfall at Honolulu, being on the leeward side of Oahu, is under 40 inches; that of the islands generally about 54 inches. The soil, whose constituent parts that of the islands generally are mainly scorie, decomposed lava, and sand, is generally thin and poor, but at the bases of the mountains and in the valleys there are extensive tracts as fertile as they are beautiful. In Hawaii alone, on the Waimea plains, thousands of sheep of the merine breed find grazing ground; and on most of the islands, while the upland slopes of the mountains are clothed with dense forests, the lower levels spread into grassy plains rich with

sugar and rice plantations.

Natural History, Products, &c.—The islands are separated from other lands by a broad expanse and great depth of sea, consequently their natural history has many special features of its own. In the high mountains there are some species of sharts aking to those of the American continent. plants akin to those of the American continent. The forest-trees are mainly to be found on the windward, being the rainy side of the mountain-langes. Tropical fruits are numerous. There are now, as has been stated, numerous sugar and rice plantations on the islands. The staple food of the natives consists of poi, a kind of thick paste made from the root of the turo plant (Arum coculentum) and raw or dried fish. The only indigenous animals are rats, mice, bats, dogs, and hogs, but others have been added since white men came to the islands; cattle, sheep, &c. having been introduced by Vancouver and other navigators. There are large numbers of semi-wild horses in the kingdom, and in some parts of the mountains wild dogs are also to be found. Reptiles are few, including on land one species of lizard and a few of the gecko; and the native birds, of which there were nineteen species, are rapidly disappearing, though foreign importations more than supply their place. The archipelago has unfortunately no mineral resources. Coral rock is the material chiefly used for building purposes, and to a less extent basalt, compact lara, and sandstone. There is a large variety of sea-shells, some of which are of exquisite heanty.

Trade, Finance, &c.—The commerce of the kingdom is gradually increasing. Up to the year 1876

the most important trade was that of the vessels engaged in the whale-fisheries of the Pacific, which now are almost extinct. In 1876 a Reciprocity Treaty was concluded with the United States, and since that date there has been an enormous development of the sugar export trade. Over 200,000,000 lb. of sugar, being eight-ninths of the total value of the exports, were grown and exported in the year 1887, the other chief articles of export being rice, wool, molasses, tallow, and hananas. The total value of produce exported from the islands in 1887 amounted to over £2,000,000. The imports, which consist ariginally of dry goods are reached, about consist principally of dry-goods, reached about half that amount. Nine-tenths of the trade is with the United States. In the foreign carrying traffic some 300 vessels were employed in 1887, while about 60 Hawaiian ships ply between the different islands. On the larger islands there are good roads, and in the islands of Hawaii and Mani

there are about 32 miles of railway, the first line baying been opened in 1879. Telegraphs have been established in these two islands, and in Honolulu the telephone is in common use. coins current in the islands are American dines, quarter-dollars, half-dollars, and dollars. The estiquarter-dollars, half-dollars, and dollars. mated revenue of the kingdom for 1888-90 amounted to over £523,000, the expenditure being estimated at over £620,000. The chief sources of revenue are customs and internal taxes. The public debt in the year 1888 amounted to £387,300, exclusive of a new loan.

History, Constitution, dc.—The islands are said to have been discovered by Gaetano in 1542, and rediscovered by Captain Cook in the year 1778. Cook met his death at the hands of the natives in Kealakekna (Karakakoa) Bay in the year 1779. In early times each i-land had a king, lmt under Kameliameha I. the islands were formed into one kingdom. He died in 1819, and was succeeded by Liholiho, who adopted on his accession the name of Kamehameha II., and whose reign was famous for the abolition of idulatry simultaneously throughout all the islands. Vancouver, who arrived with Cook in 1778, and returned in 1792 and again in 1794, had made sincere attempts to enlighten the i-landers, and succeeded so far that he was requested by the king and his chiefs to send out religions teachers to them from England. The first missionaries, however, who visited the islands came from the nearer shores of America. On their arrival in 1820 they witnessed the singular phenomenon of a nation without a religion. The instructions of Vancouver had, it would seem, not been forgatten, and had opened the eyes of the idol-worshipping natives to the grotesque absurdities of their system. But the spontaneous movement of 1819-20 was no triumph of Christianity—for Christianity had not yet claimed or even approached the Hawaiian Islands. nation land voluntarily east off the religion of their ancestors, and had not yet adopted—were not even acquainted with—any other system. The missionaries were well received, and the work of instruc-In less than forty years tion was at once begun. wite, to cipher and sew. Kamchameha II. and his queen visited England, and both died in London in July 1824. Prior to the year 1838 the government was a simple despotism, but in 1840 Kamehameha III. granted a constitution consist-ing of king, assembly of nobles, and representative council. In 1843 the independence of the Hawaiian kingdom was formally guaranteed by the French and English governments. Kamehameha IV. (1854-63) was succeeded by his hrother Kamehameha V., with whose death in 1873 the line of the Kamehamehas became extinct, a high chief, Lunalile, being elected to the vacant throne. his death in 1874 another high chief, Kalakaua, was elected king. About 1886 the unsatisfactory state of the public finances under the existing system demanded some measure of reform, and in 1887 the king was called upon to dismiss his cabinet and to grant a new constitution. The cabinet and to grant a new constitution. The present constitution was accordingly inaugurated under which the power of the crown is curtailed and the popular basis of the government extended. Under the former constitution the members of the house of nobles were nominated by the king, but now both houses are elected by all adult males, subject to the possession of educational qualifica-tions, and in the case of the house of nobles of a property qualification also.

Population and Condition of the People.—The total population of all the islands amounted in 1884 to 80,578, of whom 51,539 were males and 29,039 females. Of this total 40,014 were natives, and among the foreign members of the community the most numerous element was the Chinese, numbering 17,939, mainly employed in working the sugar-plantations; next to the Chinese, among foreign residents, came Portuguese, Americans, Germans, English, in the order given. The natives of the Hawaiian Archipelago belong to the brown Polynesian stock, and are akin to the New Zealand Maoris in race and language. They were once far more numerous than at present, having, it is said, at the time of Captain Cook's visit numbered probably some 200,000. There is no doubt that they have rapidly decreased, while the number of foreigners in the islands is continually increasing. Physically the Hawaiians are a remarkably fine and handsome race. In character they are indolent, joyons, and contented. The dress of the native men, where they have not adopted 'civilised' attire, consists merely of a wide strip of cloth round the loins, while the native women dress in a long migirdled gown ('holoku') reaching from the neck to the ankles. Excellent day-schools have been established all over the islands, and there are very few natives who cannot read and write in their own language.

The decrease of the population is probably due in part at anyrate to the introduction of foreign diseases. At the present time, however, the disease most rife among the people is leprasy. It was not till the year 1865 that the Hawaiian government set aside the island of Molokai for the segregation of lepers in order to prevent to some extent the further spread of this terrible malady. Here they lived in a state of abject misery until the arrival of Father Damien (q.v.), whose work was taken up by others after his death in 1889. The prevention of leprosy is now attracting the serious attention of the Hawaiian government and their board of health; large numbers of lepers have been removed to the Molokai settlement, and a law to facilitate their compulsory segregation, passed in 1888, renders any one liable to a fine who conceals or assists in concealing a leper or a man suspected of leprosy, so as to prevent his segregation. The death-rate of the settlement during the year ending 31st March 1889 was nearly 18 per cent, and on the 1st April 1889 the total number of lepers at Molokai was 1044.

See Miss Bird's Six Months in the Sandwich Islands (1875); Miss Gordon Cunming's Fire Mountains (1883); A. R. Wallace's 'Australasia' (Stanford's Compendium, 1881); Bishop Staley's Five Years' Church Work in Hawaii; Manley Hopkins' Hawaiian Islands; T. G. Thron's Hawaiian Almanac and Annual (1887); the Narrative of the Cruise of the Challenger (vol. i. part 2, 1885); the Statesman's Year-book, &c.

Hawarden (pronounced Harden), a small market-town of Flintshire, North Wales, 7 miles W. of Chester. The church, almost destroyed by fire in 1857, was restored from designs by Sir G. G. Scott. A free library was opened in 1889. Hawardea Castle, the sent of the Right Hon. W. E. Gladstone, dates from 1752. The park contains the ruined circular keep of a 13th-century eastle, which commands a good view of the valley of the Dec. Manufactures of earthenware, tiles, and bricks are carried on. Lady Hamilton passed her girlhood at Hawarden. Pop. of parish (1851) 6203; (1881) 9387.

Hawash, a river of Abyssinia (q.v.).

Hawfinch (Coccothraustes vulgaris), a bird of the Grosheak (q.v.) genus and the Finch family (Fringillide). It is considerably larger than the challinch; the adult male has the crown and back chestnut-brown, the neck and breast pale brown, the neck crossed at the back by a broad band of ash coleur, wings partly black, greater wing-coverts grayish-white, lesser wing-coverts black or blackish-brown. The hawfinch is a very shy bird, perching on the topmost branches of trees, or on open boughs where it can command a good lookont, and avoiding man unless subdued by the effects of hunger or cold. It is gregarious. It feeds on the fruit of the hornbeam, plum, pine, cherry, laurel, holly, hawthorn, &c. It is not uncommon in some parts of England, but is rare in Scotland. It is widely distributed over Europe and the temperate parts of Asia, and is said to be found in Egypt.

Hawick, a manufacturing town of Roxburghshire, at the confluence of the Silirig with the Teviot, 52 miles by rail SSE. of Edinburgh and 45 NNE. of Carlisle. Built in and round a hollow, with villas and mansions above, it is a place of hoar antiquity, but bears few traces thereof beyond the Moat, an artificial earthen mound 30 feet leigh and 312 in circumference, and part of the Tower Hotel, which, once the peel-tower of the Drumhanrig Donglases, and later a residence of Monnouth's widowed duchess, was the only building not burned by the Earl of Sussex in 1570. In the neighbourhood are Branxholm and Harden, old homes of the Scotts; and, older than either, there is the refrain of the June Common-riding song, 'Terihus ye Teri Odin,' which carries us back to days of heathendom. Else, all is modern—the handsome municipal building (1885); the claurches, nore than a dozen in number, and the oldest (1214) rebuilt in 1763; the splendid water-supply (1865–82); and the hosiery and tweed mills, to which, with dye-works, tunneries, &c., Hawick owes its prosperity. The hosiery and tweed mills, to which, with dye-works, tunneries, &c., Hawick owes its prosperity. The hosiery manufacture dates from 1771, and that of shepherds' plaids, tweeds, blankets, &c. from 1830. The ancient municipal constitution of the burgh, based on a charter granted by Sir James Douglas of Drumlanrig in 1537, and confirmed by Queen Mary in 1545, was reformed by special act of parliament in 1861; and since 1867 Hawick, Selkirk, and Galashiels (the Border burghs) have returned one member. Pop. (1861) 10,401; (1881) 16,184. See two works by James Wilson (1850–58), and Mrs Oliver's Upper Teviotalale and the Scotts of Buccleuch (1887).

Hawk, a name often given to almost all the Falconide, except the largest engles, but also used in a more restricted sense to designate the Accipitrine section of the family, and for the most part referable either to the goshawks (Astur) or the sparrowhawks (Accipiter). Unlike the truo falcons, they have an intoothed bill. The wings are short, somewhat rounded, and very concave beneath, and while the flight is rapid it is without much power of soaring or gliding. See Falconide, Goshawk, Sparrow-hawk.

Mawkbit (Leontodon), a gonus of plants of weedy aspect belonging to the natural order Composite, closely related to and formerly united with Dandelion (q.v.), from which it has been separated on account of the feathery pappus. The name is due to the deep tooth-like lacerations of the leaves. Several species are unlives of Britain, and these, along with a few others comprised in the gonus, are widely distributed in Europe and Russian Asia.

Hawke, Sin Edward, Lord Hawke of Towdon (1705-81), was the son of a lawyer of good middle-class stock. He was born in 1705 in London, and entered the navy while very young. The long quiet which followed the peace of Utrecht gave ldm no opportunity of seeing active service. He, however, attained the rank of commander in 1733. In 1744 he commanded the Berwick (70 gnns) in the fleet under Admiral Malhows which was lying at Hyères Bay to watch the combined French and Spanish fleets in Toulon.

In the disgracefully-conducted battle of the 11th February of that year the Berwick was one of the few ships which were handled with spirit. Hawke followed his admiral in bearing down out of the line of battle to attack the Spanish ships which forwed the rear of the allied fleet. This movement was considered irregular according to the pedantic tactical rules of the time, and, conjoined with his own violent conduct to his subordinate Lectock, own violent continue to its subgramatic Lestock, proved runous to Admiral Mathews. But Hawke established his reputation as a during officer. The Spanish line-of-battle ship, the *Poder*, the only vessel captured, surrendered to the *Borwick*; and it was not Hawke's fault that she was retaken by the enemy. In 1747 he was made rear-admiral of the white squadron, and the same year was despatched with a fleet of fourteen sail to intercept a French convoy of 252 merchant ships and the language of the West Indias. the 14th October Hawke caught the convoy of Cape Finisterre. It was guarded by a squadron of nine ships of war under M. L'Etenduère. The Freoch admiral formed line of battle, and fought heroically to save his charge. The odds were great—fourteen English ships with 784 guns to nine French with 556—and after desperate fighting six of L'Etendnère's ships struck. But he saved his convoy, which fled during the battle. In the same year Hawke became member of parliament for Bristol. By 1755 he had attained the rank of full admiral. In the following year he was sent out to supersede the unhappy Byng, who had just disgraced himself and his country at Minorca. There was, however, nothing to do in the Mediterranean. During 1757 and 1758 he was in command in the Channel directing the naval half of the combined operations on the French coast sent ont Freoch admiral formed line of battle, and fought in the Channel directing the naval half of the combined operations on the French coast sent ont by the elder Pitt. His great feat—one of the greatest ever performed by a British admiral—came in 1759. During that year the French were preparing fleets at Brest and Rochefort to cover an invasion of England. The Brest fleet, the more powerful of the two, under the command of M. de Conflaus, consisted of twenty ships carrying 1412 guns. It was watched by Hawke with a fleet of twenty-three ships carrying 1666 gnns. On the twenty-three ships carrying 1666 gnns. On the 14th November the English fleet was driven off its station by a succession of furious gales, and M. de Conflans seized the chance to slip to sca. Hawke, who had anchored at Torbay, had, however, left lookout frigates, by whom he was informed of the sailing of the French admiral. Concluding at once that M. de Conflans would make for Rochefort, Hawke steered to cut him off at Quiberon. His columnian would be said to be said to be said to the said to be said to b calculation proved accurate. On the 20th November he caught the French, and, although it was blowing a fresh gale, attacked at once. The battle was one of the most heroic ever fought on sea. In a gale of wind, on the afternoon of a November day, and with one of the most terrible coasts in the world under his lee, Hawke forced on a close action. Λ famous story tells how his sailing-master expostnlated at the order to take the flagship, the Royal George of 100 guns, into the dangerous Bay of Quiberon in such a gale and in the dark, and how Hawke replied: 'Mr Robinson, you have done your duty in pointing out the danger; you are now to obey my orders, and lay me alongside the French admiral.' The result was the destruction of the French ficet, and the collapse of the invasion scheme. It is enrious that Hawke, who had been made a knight for the capture of L'Etenduère's squadron, did not receive the peerage this victory so well descreed till 1776, when he was made Baron Hawke of Towton. It is just possible that the freedom with which he rebuked the Admiralty for its management of the fleet may have had something to do with the delay. He was Eint Lord thing to do with the delay. He was First Lord

himself in the administration of 1765, but had no further chance of distinguished sea service. He died at Shepperton, Middlesex, 17th October 1781. See the excellent Life by Professor Captain Montage 1762.

tagu Burrows (1883).

Hawker, Robert Stephen, the Comish poet, was born at Plymonth, December 3, 1803. His his grandfather, the Rev. Robert Hawker, D.D. (1753-1827), the author of the well-known Morning and Evening Portions, was for lifty years a viear in Plymouth. He was a bright boy, notable e-pecially for high spirits and an inveterate love for practical jokes. He had his education at Liskeard and Cheltenham grammar-school, and entered Pembroke College, Oxford, in 1823; Int his father, now a curate, soon found himself unable ms rather, now a enrate, soon found himself inable to keep him at Oxford. Fortunately this difficulty was obviated by the lad's own marriage (November 1824) to a lady of some fortune. He was not yet twenty-one, while his wife, Miss Charlotte I'Ans, who had been his godinother, was forty-one. With her he retuined to Oxford, where the table and the latter than the capacity of the conviction of the control of t was forty-one. With her he returned to Oxford, migrating to Magdalen Hall. He carried off the Newdigate in 1827, took his B.A. in the following year, was ordained priest in 1831, and was presented by Bishop Phillpotts in 1834 to the vicarage of Morwenstow, a small village on the wild north Cornish coast, 6 miles N. of Bude Haven. Here he laboured with devotedness for forty years, lavishing charity from his slender means upon shipwrecked mariness and his own poor alike. There had been no resident vicar for a hundred years, the quaint old church and the vicatage were in mins, and the parishioners were demoralised by generations of wreeking, sunggling, and spiritual ignorance. Hawker rebuilt his vicarage, re-tored his church, roofing it anew with shingles in spite of all advice and opposition; built and maintained a school; introduced the strange innovations of a weekly offertory and a harvest-thanksgiving, as well as a striking ceremonial largely of his own devising, and more often mount largely of his own devising, and hore often suggesting the usages of the Eastern than the Western Church. Yet he never felt any affinity with the modern Ritualists, but indeed he was in every sense a man dillicult to class. His zeal was hot against Wesleyanism and every form of dissent, for his sympathies did not range wider than his provided. He himself shared many of the superknowledge. He himself shared many of the super-stitions of his people, believing in the manifesta-tions of spirits and in the influence of the cyil eye. The spiritual world was very near and real to him: St Morwenna was no mere member of the choir at morwenna was no mere member of the choir invisible, but an influence that could still affect his everyday life. All his eccentricities were redeemed by his humanity, his humanr, and his tender love for children and for animals. His manner in preaching is described as rapt and awe inspiring; but his theology sadly lacked logic and consistency. The theologian cannot afford to allow his judgment to be dominated by fancy, but in poetry the case is altogether different. Here Hawker is absolutely altogether different. Here Hawker is absolutely delightful, with simple unsought pathos and expusiste imagery moulded into faultlessly graceful form. He has both the gifts of sweetness and smority, and withal manly strength and vigorous phrase at will. His Tendrils by Reuben, published at seventeen, he had the good sense not to reprint; shore (1832; a second series in 1836) he stamped himself unnistakably a poet. These were republished in Ecclesia (1840); with some additions, as Reeds shaken by the Wind (1843; a second cluster in 1844), and the stamped series in 1844). in 1844); and yet again, along with Genoveva, in Echoes of Old Cornwall (1846). In 1869 he republished his earlier poems in Cornish Ballads, and the Quest of the Sangreal—the latter had already appeared in 1863. His Footprints of Former Men

in Cornwall (1870) was a collection of miscellancons papers on local traditions. None of Hawker's poems is better known than his spirited ballad based on the old Cornish refinin 'And shall Trelawney die?' which both Sir Walter Scott and Lord Macaulay took at first for a genuine antique. Hawker's wife died in February 1863—a blow

592

which drove him to mclancholy and opinm, from which he was saved only by his marriage (Decem-ber 1864) to Miss Pauline Kuezynski, daughter of a Polish refugee by an English mother, and then a governess in a clerical friend's house. She bore him three dungliters, and nursed his declining years with rare devotion. Hawkor died at Ply-month, 15th August 1875, having been admitted less than twelve hours before to the Roman Catholic communion.

The biography by the Rev. S. Baring-Gould, The Vicar of Monvenstow (1876), was severely attacked by some critics, and certainly contains irrelevances enough; much less satisfactory, however, is the Memorials of the late Rev. R. S. Hawker, by the Rev. F. G. Lee (1876). A complete edition of Hawker's poems was edited, with a sensible short life, by his friend J. G. Gedwin in 1879.

Hawkers, also called PEDLARS, or PETTY CHAPMEN, persons who go from town to town, or door to door, selling goods, wares, or merchandise, or exercising their skill in handieraft. A considerable change has been made by recent legislation in regard to this class. Those pedlars exercising their calling entirely on foot have been separately dealt with from hawkers who employ one or more beasts of burden in their business. The foot-pedlars are placed under the surveillance of the police, and are exempt from excise duty. Under the and are exempt from excise duty. Under the Pedlars Act, 1871, any person whatever who can satisfy the chief officer of police of the police district in which he resides that he is of good character, is above seventeen years of age, and has resided during the previous month in the district. will receive, on due application, a certificate valid For a year, on payment of five shillings. The Pedlars Act, 1881, provides that such a certificate shall entitle the halder to exercise his calling in any part of the United Kingdom. The police have power at any time to open and search the packs, &c. of any certificated pedlar, with a view to prevent dishonesty and sunggling, &c., for which they have much appartunity. They have an appeal to the local dustice of Peace and other courts could be the property by the relies. against oppression by the police.

Hawkers who use beasts of burden, and hawkers who go from place to place, hiring rooms or booths for the exhibition of their wares, are in a different entegory. The Hawkers Act, 1888, requires them to take out an annual or half-yearly license from the excise, which is valid all over the kingdom. These licenses are at the rate of £2 per annum; new licenses are granted only on a certificate of good character. A hawker is in no case entitled to sell spirits, but he may sell ten and coffee. He must not sell plated goods without taking out a plate license, nor must be sell by anction without an auctioneer's license. Any person hawking un-provided with a license, or who refuses to produce the license to any person who calls for it, is liable to penalties under the Act of 1888. Commercial travellers, book-agents, sellers of finit, fish, victuals, or coal, also sellers in fairs or markets legally established, do not require either licenses or certificates, though it must be sametimes difficult to define whether a seller comes within the category

of a pedlar or hawker.

In the United States hawkers are generally required to take out licenses, under the local laws of the several states, the charges of course varying. Moreover, in some states and territories, as Florida and Arizona, and in the District of Columbia,

'drimmers' or commercial travellers must pay a license of from \$25 to \$200; while in Pennsylvania license of from \$20 to \$200; white in Pennsylvania it is a misdemeanour to sell goods unless either the agent or his principal be a taxpayer of the state. But in many states no such law has ever been enacted, and in others, as in Montana and Nevada, similar acts, although on the statute-book, are held to be unconstitutional and are not enforced.

Hawke's Bay, a provincial district of New Zealand, on the east coast, between Auckland and Wellington. Area, 4765 sq. m.; pop. (1886) 24,568. It presents rich alluvial plains and undulational provincial provin ing hills, with enormous forests. The bay known as Hawke's Bay was first entered by Captain Cook on 8th October 1769, and was so named after Sir Edward Hawke, then First Lord of the Admiralty. It is almost all suitable for farming, and the forests are of enormous extent. Napier (q.v.) is the port and chief city.

Hawkesbury, a river of New South Wales, rises in the Cullarin Range, and under the names of Wallondilly and Nepean flaws NE., then turns as the Hawkesbury SE., and enters the Pacific at Broken Bay, about 20 miles NE. of Sydney. It has Broken Bay, about 20 inner N. C. of Sydney. It has a total length of 330 miles, and is navigable for vessels of 100 tuns as high as Windsor. The Hawkeshury is crossed by a steel girder bridge (1886-89) on the railway between Sydney and Newenstle. It carries a double line of rails, and is one of the largest structures of its kind in the world, having soven spans of from 410 to 416 feet, and a total length between abutments of 2900 feet, The bridge completes the system of railway communication between Brisbane and Adelaide.

Hawkesworth, John, miscellaneous writer, was born in Landon, probably in 1715, but according to another account in 1719. Little is known of his early life, but he is said to have been apprenticed successively to a clockmaker and to an attorney; and for his education he was mainly indebted to his own perseverance. In 1744 he succeeded Dr Johnown personates. In 1744 he steeded Dronn-son on the Gentleman's Magazine; and in 1752 he started, with Johnson and others, a successful periodical called The Adventurer, half of whose 140 mmbers were from Hawkesworth's own pen. As a reward for its services in the cause of morality he received from the Archbishop of Canterbury the degree of LLD. He afterwards published a volume of fairy tales (1761), and an edition of Swift's works and lotters, with a Life that Johnson praised highly; and he was chosen by Captain Cook to prepare the account of his linst voyage, which formed vols. it and iii. of Hawkesworth's Voyages (3 vols. 1773), for which work the editor received £6000 from government. He died on 17th November 1773. Hawkesworth was too ardent an admirer of Johnson to attempt consciously to imitate him or to avoid doing so unconsciously. Yet his chief service to literature was that he introduced into the popular oriental lictions of last century the case of familiar writing, and so put an end to the long succession of dreary and bombastic narratives that strutted far behind in the track of Russelas.

Hawking. See Falconry.

Hawkins, Sir John, an English navigator, was born at Plymouth about 1520. He has the He has the unhappy distinction of being the first Englishman that trafficked in slaves (1502). His 'commercial' eareer closed with his disastrous third voyage (1567), after which we find him more honourably employed. He was appointed treasurer of the may in 1573, knighted for his services against the Spanish Armada in 1588, and for the rest of his life was engaged in making havee of the Spanish West Indian trade. In 1595, along with his kinsman Drake, he commanded an expedition directed against the settlements in the Spanish Main, but died at Porto Rico, November 21, in the same year. See Hakluyt's Voyages (iii.) and Purchas's Pulgrimes (iv.).

Hawkins, SIR JOHN, author of the History of Music, was born at London, 30th March 1719, the son of a surveyor, and a descendant of the famous son of a surveyor, and a descendant of the famous admiral. Bied an attorney, he acquired a fortune through his wife, and withdrew from professional work; and, becoming an active magistrate, was knighted for his services in connection with riots in 1768 and 1769. He collected a most valuable musithe Science and Practice of Music, in 5 volsquare scholar-ship, somewhat unsystematic and tedious, and as a literary performance decidedly inferior to Burney's History (which began to appear at the same time). It was much abused and ridiculed, but is a work of permanent value, and was reprinted in 2 vols. in 1876. In 1760 Hawkins issued an edition of Walton's Angler. An original member of Dr Johnson's Ivy-lane Club, Hawkins became on John-An original member of Dr Johnson's death his literary executor, and published in 1787 a Life of Dr Johnson and an edition of his works. He died 21st May 1789.—His son, John Sidney, published a history of Gothic architecture; his daughter, Leetitia, her own Memoirs, with many anecdotes of Dr Johnson.

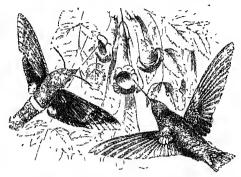
Hawk-moth (Sphingidee), a family of lepidopterous insects, forming along with the clear-winged moths (Ægeriidæ) and the burnets and foresters (Zygenidæ) the tribe Sphinges. They have stout bodies, large heads with prominent eyes, and stout clear the prominent eyes, and stout shout cuttons. short autenne. The wings are long, narrow, more or less pointed, and have always a retinaculum.



Caterpillar of Humming-bird Hawk-moth (Macroylussa

246

stellatarum). Suiface of the ground or in a cell underground which they form for the purpose. The common species of the Humming-bird Hawk-moth (Macroglossa stellatarum) in Britain has brown fore wings and reddish tawuy hind wings, and, nulike all other hawk-moths except the Bee Hawkmoths (Hemaris or Scsia fuciformis and bombyli-formus), has a spreading tuft of hairs at the end of the body. Most of the foreign species are similarly coloured; and some of the South American species resemble humming-birds so closely that they eannot on the wing be distinguished from them, the natives there and even educated whites firmly believing that the one is transmutable into the other. Smerinthus is the only genus of the British hawk-moth with dentated wings. One of the most remarkable hawk-moths is the Death's head (q.v.) (Acherontia atropos), the largest moth found in Britain. It sometimes measures nearly six inches across the wings; the fore wings are brown, the hind wings pale brown with black bands; and on the back of the thorax is a pattern in gray and black having a certain resemblance to a skull. The Privet Hawk-moth (Sphinx ligustri), the type of the family, measures about four inches across the wings, which are of a pale brown colour with darker markings; the hind wings are pale pink crossed by three black bands. Its green caterpillar, with white and lilac streaks on the sides and a black horn on the back, feeds on



Humming-bird and Humming-bird Hawk-moth (Macroylossa stellaturum) (after Bates).

privet and lilac, and the position it assumes when resting suggested that of the mythological Sphinx to the old naturalists, who applied this name to the insect.

Hawks, Francis Lister, an American clergyman, born at New Beine, North Carolina, 10th June 1798, practised law for a time with success, but in 1827 was ordained to the Episeopal ministry. He was professor of Divinity at Washington (now Trinity) College, Hartford, in 1830-31, and afterwards rector of churches in New York, New Orleans, and Saltimors. He died in New York Sentender wands feetof of churches in New York, New Officans, and Baltimore. He died in New York, September 26, 1866. In 1836 he went to England, and there obtained 18 folio vols. of MSS, relating to the Episcopal Church in America, of which he had been appointed historiographer. In 1836-39 he published 2 vols. of Contributions to the Ecclesiastical History of the United States, dealing with Virginia and Maryland. Among his other works are a Com-mentary on the Constitution and Canons (1841), and, with Bishop Perry, Documentary History of the Protestant Episcopal Church (vols. i. and ii. 1863-64); and he edited Alexander Hamilton's state-papers (1842), Commodore Perry's Expedition to Japan (1852-54), and Appleton's Cyclopædia of Biography 1856).

Hawksbeard (Crepis), a genus of annual and biennial plants belonging to the natural order Composite, so closely related to Hawkweed (Hieracium) that some of the species are referred to the one genus or the other according to the peculiar views of individual botanists. The species are widely distributed through Europe and Asia. Doubtful medicinal properties have been ascribed to several species, and *C. lacera*, a native of the Apennines, is said to be poisonous.

Hawksbee, or Hauksbee, Francis, English natural philosopher, was born in the later half of the 17th century, and died about 1730. He was admitted a Fellow of the Royal Society in 1705, and appointed curator of experiments to the society, and in 1723 was elected assistant-secretary. carried further the tentative observations by Dr Gilbert and Boyle on the subject of electricity, and by his experiments laid the scientific foundations of that branch of knowledge. He contributed forty-three memoirs to the *Philosophical Transactions*, chiefly on chemistry and electricity, between 1704 and 1713. His chief independent work, published in 1709, was entitled *Physico-Mechanical Experiments* on various Subjects; touching Light and Electricity producible on the Attrition of Bodics. He is also well known as the improver of the earlier air-pumps

of Boyle, Papin, and Hooke, and as the first who used glass in the electrical machine.

Hawkweed (Hieracium), a genus of plants of the natural order Composite, sub-order Cichoracea. The species are



Orange Hawkweed (Hieracium aurantiacum).

the exception of the Orange Hawkweed (II. aurantiacum), a native of the south of Eusouth of rope, which on account of its handsom e orange flowers is frequently cultivated in The gardens. popular name is founded on an ancient belief that birds of prey used the jnice of the species strengthen to their vision.

perennial herbs of no popular interest with

German the German Epervière all The English name Hawkweed, Madicitis-krant, and the French Eporoidre all testify to this curious belief having been formerly universally entertained.

Hawkwood, SIR JOHN, Italianised L'Acuto or L'AGUTO, an English captain who won great renown and much riches as a condottiere in Italy in the wars of the 14th century, was the son of a well-to-do tanner of Sible Hedingham, in Essex. Having on tanner of Sible Hottingnam, in Essex. Having embraced the calling of arms, he distinguished himself at the battles of Creey and Poitiers, thereby winning the favour of the Black Prince; he was knighted by Edward III. After peace was signed at Bretigny (1360) he gathered a band of mercenary soldiers and led them to Italy, where he at first took service with Pisa against Florence. Then, after lighting in most of the petty Italian wars of the period, notably for the Viscouli and for wars of the period, notably for the Viscouti and for Pope Gregory XI., he agreed to light the battles of Florence in return for an annual pension. His last years were spent in the neighbourhood of Florence, and there he died in 1394, and was honoured with a magnificent public funeral. See Nichol's Bibl. Topog. Brit., vol. vi.; Temple Leader and Marcotti's Life (Eng. trans. by Mrs Leader Scott, 1889); and Quarterly Review (Jan. 1890).

Haworth, a moorland village in the West Riding of Yorkshire, 4 miles SSW. of Keighley by a branch-line. The old church has been ruthlessly domolished, but in the churchyard are the graves of Charlotte and Emily Brontë. Pop. 3816. See Haworth, Past and Present (Bradford, 1889).

Mawse (akin to Icel. hals, 'the neck'), part of vessel's bow, in which the hause-holes are ent. Through the hawse-holes the cables pass which hold a vessel when she is moored with two anchors out forward-one on the starboard, the other on the port bew. - Hawser is a small cable or a large rope.

Hawthorn (Crategus oxyacantha; see Crategus), a shrub or small tree, a native of Europe, Siberia, and the north of Africa, common in Britain, and much planted both for hedges and fer ornament. It varies in height from 6 or 8 to 20 or 25 feet. It has reundish obovate three-to five-lebed decidnous leaves, and coryunbs, generally of white varies advanted or sometimes does ally of white, rose-coloured or sometimes deep crimson flowers, succeeded by a small red fruit

(haves) with yellow pulp, the central stony part bearing a very large proportion to the pulp. There bearing a very large proportion to the pulp. There are many varieties of hawthorn, and, curiously enough, some have only one style, whilst some have several. The variety called Glastonbury Thorn—because supposed to have originated at Glastonbury (q.v.)—is remarkable for its early flowering, which often takes place in the middle of winter, whilst the common kind is not in flower till May or June. The winter flowers of the Glastonbury variety are, however, not generally followed by fruit, and a second flowering often takes place in the same year. The common hawthorn is often popularly called May, from the season of its flowering in England. It is also called Whitethorn, in contradistinction to the Sloc or Blackthorn. The perfume of the blossoms is strong but delicions. The use of the hawthorn for hedges is almost universal in Britain. It has also strong but delicions. The use of the hawthorn for hedges is almost universal in Britain. It has also sometimes been employed as a stock on which to graft apples and other Pomacere. Several dealle-flowered and select single-flowered varieties are propagated by budding and gratting for the adornment of lawns and pleasure-grounds. A fermented liquor, which is very intoxicating, is made from the fruit in many parts of France. For the Cockspur Thorn of North America, and the Pyracanth Thorn, see CRATEGUS.

The hawthern is particularly valuable as a hedge-plant, in consequence of its strong and plential spines, its long life, and its ready adaptation to very various soils. For this purpose it is propagated by seed: the haws are laid in a heap to rot, with a mixture of sand or fine mould, and, in a year or sixteen months atter, the seeds are sown in ground carefully prepared. The young plants are kept clear of weeds, and often grew to the height of a foot or two feet in the first season (see Hepges). Hawthern hedges bear trimming very well. Young hawthern plants are called quicks or quicksets, because used to make living

(quick) fences.

An old English tradition regards Christ's crown of thorns as made of hawthorn; for the same reason the French call it 'Pépine noble.' In south Germany the tradition pointed to blackthorn, as elsewhere to some kind of buckthorn. Whitethorn was much favoured by fairies, old and lonely themers being accorded by fairies, and and lonely themers. trees being regarded as their trysting-places.

Hawthorne, Nathaniel, American author, born July 4, 1804, at Salem, Massachusetts. He was descended from English Separ-copyright 1800 in U.S. atist stock, and the character of by J. B. Lippincott by J. B. Lippincott Company. his ancestry seems to have made company. an early and enduring impression on his thoughts. This impression did not lead him to follow out and exemplify in his own career their modes of action, but rather caused him to turn and reflect upon the nature of his predecessors and the conditions amid which they lived. Probably we owe to this inclination the singular interest and penetrating quality of vividness with which he imbued his seenes from early New England life; and the intensity of concentration which he applied in dealing with moral problems in his romances reveals in him the character of the modernised Puritan. The first American Hawthorne (or, as the name was then spelled Hathorne) was William, who migrated from England (Wiltshire?), in 1630, to Salem in New England, where he became a leader of the colonial seldiery and a nagistrate, distinguished for both bravery and eloquence. 'The figure of that first ancester,' wrote Hawtherne, in his sketch of The Customhonse, 'invested by family tradition with a din and dusky grandeur, was present to my boyish imagination as far back as I can remember.' William Hawtherne took part in the persecution of the Quakers. His son John, also a military officer and magistrate, presided at the famous trials of the Salem witchcraft cases. Daniel, the author's grandfather, was a member of an American regiment, and also commanded a privateer, in the war of the Revolution against Great Britain.

Daniel's son Nathanicl, 'a silent, reserved, severe man, of an athletic and rather slender build, and habitually of a rather melancholy cast of thought, hecame a captain in the merchant marine; the family having suffered a decline of fortune, and the male members mostly following the sea. He died when his son Nathaniel, the subject of this article, was but four years old. widow, a woman of great refinement and religious sensibility, lived always afterwards in close retirement and straitened circumstances, with her two daughters and her son Nathaniel, who, from his ninth to his thirteenth year, was somewhat confined by an accidental lameness. His intense love of reading was doubtless fostered by these conditions. At fourteen he went with his mother to a lonely farm in the woods of Raymond, Maine; forming there, as he thought, that habit of soli-tude which became one of his permanent traits, but was probably inherited in part from his father. He was, however, a healthy, happy lad, given to outdoor sports and exercise, and quite free from morhidness in spite of his fondness for solitude. In Raymond he began to keep note-books, recording his observations; a practice which he resumed in later life and continued through the greater part of his career. At Bowdoin College, where he graduated in the class of 1825, with the poet Longfellow, he took a good rank, and gave prononneed signs of his tendency to anthorship, having begun his first novel during his undergraduate course. But the conditions in the United States were at that period unfavourable to authorship as a pro-fession, and his progress was slow. After his re-turn to Salem he shut himself up for twelve years 'in a heavy scelusion,' writing tales and verses. Of the latter few have survived. In 1828 he published anonymously his first novel, Fanshave, which was unsuccessful. Continuing to contribute to annuals and magazines, under various pseudonyms that made it still more difficult for him to become known, he edited in 1836 a short-lived periodical for S. G. Goodrich, for whom also he wrote *Peter Parley's Universal History*, an enormously profitable publication, of which Goodrich figured as the author and took the proceeds, while Hawthorne received only one hundred dollars.

Meanwhile some of his short fictions had gained

such favourable notice from the London Athenœum that in 1837 a group of them, to which he gave the name Twice-told Tales, was issued in one volume, the risk of which was assumed, without the knowledge of Hawthorne, by his friend and classmate, H. N. Bridge. This book, which an impartial and competent critic has said 'marked a distinct epoch in American literature, was reviewed with high praise by Longfellow, and substantially made the beginning of Hawthorne's fame. Yet he still had long to wait for its fulfilment. The full force of the new author's genius was by no means appreciated in his own country; and diligent though he was with his pen, he was still unable to live by it. In January 1839 the historian Bancroft, then collector of the port of Boston, appointed him weigher and gauger in the custom-house, which post he held until early in 1841. In April he allied himself with an industrial association at Brook Farm (q.v.), near Boston, founded by Dr George Ripley (afterwards a distinguished critic), with a number of highly cultivated men and women, among whom were George William Curtis, Charles A. Dana, and Margaret Fuller. The object was to establish an

idyllic, semi-socialistic community, in which every member should do manual labour and share profits in common, while earrying on his or her chosen intellectual work, and maintaining in the commuuity a separate single or family life. Hawthorne, who was about to marry, had some hope of making his house here, but finding the experiment unsatis-factory he withdrew. Meanwhile he wrote and published in three parts a series of simple stories for children, from New England history—viz. Grandfuther's Chair, Famous Old People, and Liberty Tree (1841). In July 1842 he wedded Sophia Amelia Peabody, of Salem, his union with whom became one of the rarest and most beautiful chapters in the annals of happy marriages. account of Hawthorne would be complete which failed to lay stress upon his marriage to this lady, who, as their son Julian has written, 'was a blessing and an illumination wherever she went; and no one ever knew her without receiving from her

far more than could be given in return.'
Removing to Concord, Massachusetts, he issued Biographical Stories (1842) for children, brought out an enlarged two volume edition of the Twicetold Tales (1842), and lived for four years in the old colonial manse, previously occupied by the ancestors of Ralph Waldo Emerson, and by Emerson himself, overlooking the field of the first battle of the Revolution. Here he dwelt happily, preserving his old custom of comparative isolation, and, seeing but little of his famous neighbours Emerson and Thoreau. He wrote many sketches and studies for the Democratic Review. These formed studies for the Democratic Review. These formed the Mosses from an Old Manse (1846). But he was poorly paid, or not at all. The Review failed; and, as he had lost all his previous savings invested at Brook Farm, he was forced to leave this home, and accept a place in the custom-house again—this time as surveyor, in his native town, Salem. The time as surveyor, in his native town, Salem. The place was uncongenial, and for nearly four years he remained silent as an author. But by the expiration of his term he had completed (February 1850) The Scarlet Letter, which at once gained great renown, and still remains perhaps the best known renown, and sain remains perhaps the best known of his works. It did not, however, bring him peeuniary ease. Hiring a small house at Lenox, Massachusetts, he entered upon a phase of remarkable productivity, showing that he had needed only encouragement and recognition to bring his powers into full play. At Lenox he wrote The House of the Seren Gables (1851), which added to House of the Seren Gadles (1851), which added to his celebrity and popularity; also The Wonder Book, a reeast of classic legends for children (1851); and prepared The Snow Image, which was not published until 1852. In the winter he wrote at West Newton The Blithedale Romance, which incidentally drew colouring from the Brook Farm episode, though in no way attempting to depict it as a fact. Having bought at Concord a small house, which he christened The Wayside, he settled there in the summer of 1852, and wrote a Life of General Franklin Pierce, his old college friend, who had been nominated for the presidency of the United States. Immediately afterwards he completed Tanglewood Tales, a continuation of The

Wonder Book; but this appeared first in 1853.

Pierce, on his inauguration as president in March 1853, named Hawthorne to be consul at Liverpool, a Incrative office which his experience in the custom-house qualified him to fill. The appointment was confirmed by the senate; and although Hawthorne had resolved to accept nothing from the president, and much persuasion had to be used to change his mind, he finally took the appointment, and sailed for Liverpool, midsummer, 1853. He held the consulate until near the close of 1857, attending closely to his duties, but spending part of the time in London, and visiting various portions

of England and Scotland. A sojonyn of a year and a half in Rome and Florence, beginning January 1858, supplied him with the materials for a new romance, The Marble Faun, hetter known in England as Transformation, which he wrote at Redear, Yorkshire, in the autumn of 1859, and published in 1860. In June of this year he returned to Concord, where approaching ill-health, and the mental depression cursed by the outbreak of civil war in the United States, impeded his efforts at literary composition. He wrote, however, a number of brilliant papers embodying observations and experiences in England, which were printed in the Altantic Monthly, and then issued in the volume Our Old Home (1863). He also began a new romance, femuled on the idea of an elixir of immortality. It remained unfinished at his death, which occurred in the night of May 18, 1864, at Plymouth, New Hampshire, whither he had gone on a journey in search of health, with his friend ex-president Pierce. He was buried at Concord, Massachusetts, May 24, in a spot near which are the graves of Emerson and Thorean.

In his style he early developed that nuturity of In ms styre ne carry accompant on a matter, of dignified composure, free from constraint or affecta-tion, and that incid expression, which are among its most characteristic traits. With little faculty its most characteristic traits. With little faculty for the harmonies of verse, he had a singular command over the musical qualities of prose, enabling him to produce periods remarkable for their sonorous richness and delicate cadences, that sometimes raise them almost to the plane of poetry, yet never destroy their character as mose by interjecting the actual rhythms of verse. Although exceptionally fitted for conveying subfleties of thought and fantasy, his style is equally adapted to the comprohension of children, being invariably clear, and strongly marked by common sense. Another noticeable peculiarity is that, in the entire range of his writings, quotation is almost never resorted to; the author's mind being apparently so self-centred that its originality felt no need of aid or illustration from other writers. The superlative merits of flauthors are table were but slowly recognised in Hawthorne's style were but slowly recognised in his own country; but his fame hus rapidly and steadily increased since his death. Several of his works have been translated into foreign languages; and he is now generally esteomed as one of the greatest imaginative minds of the century, helding a place in the first rank among masters of modern English prose.

The personal appearance of Hawthorne was tall, vigorons, and commanding. Powerful physically, and in every way a strong specimen of manhood, he yet in his manner and presence showed the gentleness of a woman. His intimates were few, but with them he was a genial courade, as he was also a delightful companion in his household. The union in him of strength and sensitiveness has been well described by James Russell Lowell:

First, he from sympathy still held apart.
By shruking, over-engeness of heart.
New England's poet, sont reserved and deep,
November nature with a name of May.

The best extant portraits of Hawtherne are the photographs taken by Mayall of London in May 1860. One of these was engraved in *Harpers*' Magazine for July 1886; another in the Century Magazine for May 1887.

A preliminary version of the unfinished romance was edited by his daughter Una, his oldest child, with the aid edited by his daughter Una, his oldest child, with the aid of Robert Browning, and was published under the title of Septimius Felton (1872). Another version, edited by his son Julian, appeared as Dr Grinshaw's Secret (1883). Both these forms had been abandoned by the author, who left in MS, portions of the work as he meant to complete it, The Dolliver Romance (1876). His widow (who died in London, February 26, 1871) edited and published his American Note-books (1868), English Note-

books (1870), and French and Italian Notebooks (1871); besides bringing out a volume of her own Notes in England and Italy (1868). George Parsons Lathrop, who married that the first state of Hauthorne's younger daughter Rose, published A Study of Hauthorne (1876), containing many biographical details, and chited the Riverside edition of the complete works, with notes and a sketch of the author's life (II vols. 1883). Rose, the second daughter and youngest child (born in 1851, married 1871), has also made numer cunic (born in 1891, married 1871), has also made numerous contributions to periodicals in prose and verse, and published in 1888 a volume of poems entitled Along the Shore. Una, the eldest child, born in 1844, died in London in 1877. Julian Hawthorne, the author's son, issued a complete memoir, Nathaniel Hawthorne and his wife, containing correspondence and much other valuable matter (2 vols. 1883). Henry James, junior, published a brillaut but unsympathetic monograph on Hawthome, in the Euglish Men of Letters' series (Lond. 1879); and James Russell Lowell a volume on the same subject in 'American Men of Letters' (Boston, 1890).

JULIAN HAWTHORNE, son of the great Hawthorne, and himself a fair novelist, albeit nnequal and crude in style, was born at Boston, Massachusetts, June 22, 1846. After his studies at Harvard he devoted himself to engineering at Dresden; next worked under General M'Clellan in the New York Docks, returning to Dresden to pursuo a life of lotters, busily continued later in England and in New York. His first novels, Bressent (1873) and Idolatry (1874), have been well followed by Garth (1875), Sebastian Strome (1880), Fortune's Fool (1883), and Dust (1884); and, not so well, by an immunerable series of shorter stories. some-not over good-of the detective class,

Hay (from the same root as here, hee), the stems and leaves of grasses or other plants dried for Fodder (q.v.) of cattle. Throughout the grazing and dairy districts of Iroland and England a large breadth of old pasture is annually cut. In Scotland, however, little of this old natural grass is converted into hay, and the eron consists mainly of clover and sown grasses in which ryegrass bulks largely. This requires less turning and labour than the closer succendent natural grasses, and with twice turning, and a week or ten days' drying, will generally be fit for the rick, into which the English farmer at once places it. In Scotland the weather is seldom sufficiently fine to fit the hay, within a moderate time, for a large rick, and the practice here, as in the moister parts of England and in Ireland, is to put it, after a few days, into cocks, containing one or two hundredweight, and thence, after another week, into what are technically called tramp-ricks, containing from one to two tons. From these it is transferred at any convenient time to the rick-yard. This practice, although very prevalent in the north, is attended with loss of time and labour, and, moreover, blenches and dries up the hay, giving it the appearance of the strength of the supervision of the ance of straw, and preventing that gentle heating which English farmers desire both in their clover and grass hay. In the United States timothy is the best hay-making grass; next come redtop, orchard-grass, and blue-grass or June-grass. The management of the natural grasses of which

most English hay consists is somewhat different, and the process is seen in perfection in Middlesex and various of the counties about London. The great matter—too generally overlooked in Scotland—is to preserve the colour and flavour of the grass. This may be done by frequent turning, so as to have it rapidly dried, and if possible without the deteriorating washing of repeated raius. Attificial drying best attains this end, but is of course impracticable on the large scale. In the best style of English haymaking the grass, after being cut with the scythe or machine, and as soon as the dew is off, is shaken and spread out by means of forks or of a tedding-machine drawn by a horse. and the process is seen in perfection in Middlesex

It is not allowed to lie long exposed to the sun, but before evening is drawn together by rakes into wind rows, which, if there is any prospect of rain, are made up into small heaps or cocks. fain, are made in fine smart deaps of cocks. It is again spread out next morning, or on the return of favourable weather; and when the operations are expedited by wind and snn, the hay will be ready for the rick by the second or third day. There is, however, much difference in the time during which the hay requires to lie out; the bulk of the crop and the quality of the land must be especially considered. When the grasses are cut in bloom, as they should be, and before their seed ripens and their stems get tough and hard, they contain the largest amount of moisture, and require careful making, but produce then the most nutritive and palatable hay. As soon as it is thoroughly dry it should be put at once into the stack or rick, and well trodden down. A certain amount of heating improves the flavour, and renders the hay more palatable to every kind of stock. When, as is paratable to every kind of spock. When, as is sometimes the case, it is imperfectly made, or picked up too soon, it gets overleasted, and becomes dark brown or black, while its untritive properties are diminished; it is, moreover, apt to disagree with both horses and cattle, and can be profitably used only when mixed with straw and ent into chaff. Indeed it has been proved by experiments that hay may be so damaged by bad weather in the process of making as to be muchle weather in the process of making as to be made to maintain, not to speak of increasing, the con-dition of animals fed upon it. Hay put together when damp from rain or dew does not heat, as it does when it contains an under amount of natural moisture, but specdily moulds. When hay has been weathered and injured by repeated rains, it may be rendered more palatable by scattering a little common salt or specially prepared spice over the rick whilst it is being built. In Scotland, eight or ten pounds of salt to the ton is used alike for the clover and grass hay. In mid and southern England the best hay is generally got up in June, in Scotland not until the middle of July. The Hay crop averages from one to two tons per acre. that has stood for seed is tougher and less nutritive than that cut earlier, for the sugar, gum, and gluten of the matured seed have been abstracted from the stems. Sec also SILAGE.

Hity, John, an American author, was born at Salem, Indiana, 8th October 1838, graduated at Brown University in 1858, and was admitted to the Illinois bar in 1861. Almost immediately after he became assistant private secretary to President Lincolu; and during the war he served for some months in the field, retiring with the brevet of colonel. He was afterwards first secretary of legation at Paris (1865-67) and Madrid (1868-70), and charge d'affaires at Vienna (1867-68); and in 1870-75 he was on the staff of the New York Tribune, acting as editor for some months. In 1879-81 he was first assistant-secretary of state. His Pike County Ballads (Bost, and Lond, 1871) include 'Little Breeches' and 'Jim Bludso;' he has also published Castilian Days, and, with J. G. Nicolay, 'Abraham Lincoln: a History' (Century Magazine, 1886-90).

Hayden, Ferdinand Vandeveer, LL.D., geologist, was born at Westfield, Massachusetts, 7th September 1829, studied at the Albany medical college, and during the greater part of 1853-62 was employed in surveys in the north-west. He served as surgeon in the Union army during the war, and filled the chair of Mineralogy and Geology in the University of Pennsylvania from 1865 to 1872. In 1867-69 he carried out the geological survey of Nebraska, and afterwards was director of the geological survey of the territories of the United

States, until in 1879 the various national surveys were combined in the geological survey of the United States. Till 1886 Dr Hayden remained at the head of the Montana division. He died 18th January 1888. He published many papers, besides numerous and valuable government reports.

Haydn, Joseph, a German composer, was born at the village of Robran, on the confines of Hungary and Austria, 1st April 1732. He was the son of a poor wheelwright; and manifesting great musical talent, he was received at the age of eight into the choir of the eathedral of St Stephen's, at Vienna. Here he remained till his cighteenth year, acquiring a practical rather than a theoretical knowledge of his art, by singing the music of the best Italian and German religious composers. In that year, however, his voice broke, and he lost his place as a chorister. He wandered about the streets of Vienna, and carned a precarious livelihood by playing the violin in serenading parties and at dances. A charitable singer offered him a lodging, which for a short while he availed himself of. Ultimately, by the exercise of great thrift, he was enabled to hire an attic and a piano; then he devoted all his leisure time to study. He bought by accident the six sonatas of C. P. E. Bach at a cheap bookstall, and the indefatigable study of them revealed to him the possibility of new form in nusic—form which should be the reaction against Vieuna. Here he remained till his eighteenth nusic—form which should be the reaction against the old contrapuntal style of J. S. Bach and Handel, and which it became theneeforward his mission to inaugurate. The main essentials of this reaction were the abandonment of the fugue form as the basis of musical composition, and the substitution in its room of two free melodies as themes for treatment, not necessarily constructed in double counterpoint to one another. During this period of assidnous study Haydu still kept up his connection with the serenaders and dancehis connection with the serenaters and dance-players of Vienna, for whom he often now wrote the music. One evening when playing a screnade of his composition, along with other instru-mentalists, under the window of Fran Kurz, the wife of the theatrical manager of that name, her husband was very much struck by the music, and calling Haydn up, commissioned him to write an opera as melodioms as the serenade. This was the becoming of his fortures. His opera made him beginning of his fortunes. His opera made him acquainted with the poet Metastasio, at that time a tutor in Vienna, by whom he was introduced to the composer Porpora, and enabled to remedy the deficiencies of an education principally obtained hitherto through private study.

In the later part of 1750 he composed his first quartet for stringed instruments. In 1759 Count Morzin engaged him as capellmeister. For Count Morzin's orchestra Haydn wrote his First Symplony in D. The once obseme musician was now a popular music-master in Vienna. He married at this time Maria Anna Keller, the daughter of a wig-maker, who had been kind to him in his days of pennry. This union did not prove a happy one. The circumstances of it were singular; he had designed to marry the younger sister, but she had determined to retire into a convent, and Haydn was persuaded by the father to take the elder one instead, for whom he had always entertained an objection. 'It is nothing to her,' said Haydn near the close of his life, 'whether her husband be a cobbler or an artist.' Her sole ambition was to squander Haydn's earnings. In 1760 Prince Exterhazy offered him the post of vice-capellmeister. His duties in this new situation were to conduct two operas a week, for which he sometimes had to compose the music, to conduct and compose for an orchestral concert every afternoon, to have a fresh composition for the prince's 'reception' every morning, besides supplying the music for incidental

water-parties, dances, &c. Many of Haydu's most beautiful symphonies were written here, and the greater number of his magnificent quartets. The excessive demands on his invention do not seem to have impaired its fertility in the slightest. After the death of Prince Esterbazy in 1790 Haydu accompanied Salomon the violinist to England, where, in 1791-92, he produced six of his Tivelve Grand Symphonics. His reception was brilliant in the highest degree. On his return to Vienna he had Beethoven for a pupil. In 1794 he made a second engagement with Salomon for England, and during this period brought out the remaining six symphonics. In England he first obtained that recognition which afterwards fell to his share in his own country. On his return to Austria he purchased a small house with a garden in one of the suburbs of Vienna. Here he camposed his oratorios the Creation and the Scusons. The former work, the barmonies of which are pervaled with the fire of youth, was written in his sixty-fifth year; the Scusons (completed in cleven mouths) was almost his last work. He died at Vienna, 31st May 1809.

In person Haydn was below the middle stature. His features were regular, and the general cast of his countenance a stern one. He had the peculiarity of never laughing aloud. He was very neat and methodical in his habits—composing a certain number of hours daily, and wearing full court dress when so engaged. His musical style is marked by the predominance of melody—melody in its tenderness, melody in its power, melody incessant. His works have therefore more spontaneousness and charm than the elder school of Bach and Handel, but less massiveness, sublimity, and majesty. He clearly realised and pursued his aim, laying down the principle that 'melody is the charm of music, and the invention of a fine air is a work of genius.' He is the father of the symphony, and conduced more than any other man to that separation of instrumental music from vocal, unknown or little practised before his day, which has given an independent life to instrumental music up to the present time.

Haydn's works are exceedingly numerons, comprising 125 symphonies, 83 quartets, 38 tries, 14 operas, 8 oratories, 175 pieces for the haritone, 24 concertes for different instruments, 14 masses, 1 Stabat Mater, 10 smaller church pieces, 44 sonatas for the pianoforte, with and without accompaniments; 12 German and Italian songs, 39 canzonets, 13 hymns in three and four parts, the harmony and accompaniment to 364 ald Scottish songs, besides a prodigions number of divertissements and pieces for various instruments.

Compare Carpani's Le Haydine (2d od. Padua, 1823); Ifaydn's autobiographical sketch, first published in the Wiener Zeutschrift für Kunst (1836); Karajan's Joseph Haydn in London (Vienna, 1861); Pohl, Joseph Haydn (3 vols. 1875-90); Miss Townsend's Life of Haydn (Lond, 1884).

Maydon, Benjamin Robert, historical painter, whose biography forms one of the saddest pages in the record of British art, was born at Plymonth on 25th January 1786. He attended the grammar-school of Plympton, where Sir Joshna Reynolds had been educated; and his father, a bookseller, being desirons that his san should follow his own trade, placed him in his shop. But, in spite of delicate eyesight, the boy was resolved to become a painter, and in May 1804 he was admitted a student of the Royal Academy, where he was befriended and influenced by Fuseli, the keeper, Three years later he exhibited his first picture, 'Joseph and Mary resting on the Road to Egypt,' and after studying assidnously for three months the Elgin marbles, whose purchase by the nation he afterwards enthusiastically advo-

eated, he produced his 'Dentatus,' a commission from Lord Mulgrave. The work was coldly received by the Academy in 1809, and hung in the of the painter's implante with that body, which embittered his life and damaged his prospects. In the following year he began a large subject from Macbeth, which had been commissioned by Sir George Beanmont, but was afterwards declined. He was more successful with his 'Judgment of Salomou,' probably his finest production, now in sudmon, probably his linest production, now in the collection of Lord Ashburton, which he sold for 700 gaineas. It gained a prize of 100 guineas from the Royal Institution, which had awarded a like sum for the 'Dentatus,' Having visited the Continent with Wilkie in 1814, and studied the old masters in the Louvre, Haydon began his 'Christ's Entry into Jerusalem,' which was completed in 1820, and realised £1700 by exhibition in the Egyptian Hall, London. It is now in the articles of Dishardon and Articles. Egyptan Hatt, London. It is now in the art-gallery of Philadelphia. Another immense reli-gions subject, 'The Raising of Lazarus,' was com-pleted in 1823, in the midst of great difficulties. The artist had been arrested for debt during its progress, and during the rest of his life he was never able to free himself from financial embarrass. never able to free himself from financial embarrassments, though it was proved that during six years, from 1831 to 1836, be had earned £407 by his art. His 'Mock Election,' purchased by George IV. for 500 gnineas, was founded upon a scene witnessed by the painter while a prisoner in King's Bench. He reserted to every kind of expedient to meet the needs of the moment. Greatly against his will be took to portrait-painting; a public subscription was raised on his behalf; he raffled his 'Eucles' and 'Xenophon's First Sight of the Sea;' he delivered a popular scrices of lectures on painting and design in 1836, published in two volumes in 1844. In 1832 Lord Gray commissioned the well-known picture of 'The Reform Banquet,' and in 1834 the Duke of Sutherland gave 400 gaineas for a 'Cussandra.' Haydon had never wearied of arging upon government and persons of influence the necessity for the national encouragement of art, and it was a bitter disappointment when he failed to obtain employment by the commissioners for the decoration of the Houses of Parliament. He was further crushed by the entire want of success which attended his exhibition of two completed pictures from the designs which he had prepared pictures from the designs which he had prepared for the cartoon competition; his mind gave way, and on 20th June 1846 he shot himself in his studia hefore his unfinished painting of 'Alfred's First Parliament.' The works of Haydon are elevated in aim and subject, and Mr G. F. Watts, R. A., has pronounced that 'his expression of anatomy and general perception of farm are the best by far that can be found in the English school, and I feel even a direction towards something that is only to be found in Phidias.' His works, however, are very unequal in their several parts; his excention was seldom equal throughout to his conception; and most of his productions bear only too evident traces of the haste and the untoward cir-cumstances amid which they were executed. See Journals, edited by Tom Taylor (3 vols, 1853); and his Correspondence and Table Talk, with a Memoir by his son (1876).

Haye, LA. See HAGUE.

Hayes, Augustus Allen, chemist, was born at Windsor, Vermont, in 1806, studied chemistry under Professor Dana, and settled in Boston in 1828. He discovered the organic alkaloid sanguiaria, carried through experiments which led to the construction in 1838 of improved furnaces and boilers, suggested the process of reducing pig to

malleable iron without loss by the use of the oxides of iron, as well as new processes in copper-smelting, the decomposition of alcohol, and the formation of chloroform, and made important investigations into the properties of gramo. He also examined the constitution of sea-water and fresh water at various depths, prepared a report for the many department on the copper-sheathing of vessels, and supplied a novel process for the manufacture of saltpetre. Hayes was for many years state assayer of Massachusetts, and died in Brooklinc there, 21st June 1882.

Hayes, ISAAC ISRAEL, Arctic explorer, was born in Chester county, Pennsylvania, 5th March 1832, graduated in medicine at the University of Pennsylvania in 1853, and sailed as surgeon in the Kane expedition in search of Franklin. The story of his attempt to reach Upernivik in 1854 is told in An Arctic Boat-journey (1860). In 1860-61 he conclucted a second expedition to the Arctic regions; and in 1869 he again visited Greenland. His third voyage is described in The Land of Desolution (1871). He was surgeon of volunteers from 1862 to 1865, retiring with the brevet rank of lieutenant-colonel; and he served in the New York assembly for five years. His Arctic work was recognised by medals from the London and Paris geographical societies. He died 17th December 1881.

Hayes, RUTHERFORD BIRCHARD, nineteenth president of the United States, was born at Delapresident of the United States, was born at Delaware, Ohio, 4th (October 1822. He graduated at Kenyon College, Ohio, in 1842; and, having studied law at Harvard, he practised as a lawyer at Ciucinnati, 1849-61. In the civil war Hayes served with distinction as an officer of volunteers, being once severely wounded, and ultimately attained the rank of brevet major-general. He was roturned to congress from Olio in 1865 and 1866, chosen governor of his state in 1867, and re-elected in 1869 and again in 1875. In 1876 he was selected as the Republican candidate for the presidency of the United States, the Democratic candidate being Savinel J. Tilden (q.v.). The election which fol-lowed was notable for the exciting complications and the period of tension and anspicion that ensned. In Louisiana two electoral boards were commissioned by rival claimants to the governorship, and in some of the other states questions arose touching the legality of the return of the Republican presidential electors. Finally, an electoral commission was greated by each of commission. commission was created by act of congress, consisting of five judges of the supreme court, five senators, and live representatives. This body, made up of eight Republicans and seven Democrats, gave the disputed votes to Hayes, by a majority of eight to seven. The electoral vote was thus returned at 185 for Hayes against 184 for Tilden; the popular vote, as counted, stood 4,284,265 for Tilden and 4,033,295 for Hayes. This decision was generally acquiesced in, although the conviction of the Democratic party that their candi-date had been unjustly deprived of office remained unshaken; and as late as 1878 the Democratic majority of a congressional committee of investiga-tion issued a report declaring the action of the returning boards in Lonisiana and Florida to have been frandulent. Under the Hayes administration the country recovered much of its commercial prosthe country recovered unter of its commercial pros-perity, which had suffered severely in the financial crash of 1873. Two features in Hayes's policy were reform of the civil service (in pursuance of which he removed from the collectorship of customs at New York Chester Alan Arthur, q.v.) and the conciliation of the southern states. He was also active in pressing forward the resumption of specie payments; but the bill for the monetisation of

silver was earried in 1878 against his veto. See Life by W. O. Stoddard (New York, 1889).

Hayesine, also called BORATE OF LIME and ULEXITE, is a boronatrocalcite, a double salt of sodium and calcium, found in Pern, Chili, &c., and is a source of Boracic Acid (q, v_*) .

Hay-fever, also called HAY-ASTHMA and SUMMER-CATARRH, a disease mostly met with in early snunner, has as symptoms those of a common catarrh—viz. reduces and swelling of the nasal mucous membrane, with a copions watery discharge and repeated paroxysms of succeing, irritation of the eyes, and intense headache. There are also present general malaise, loss of appetite, and more or less feverishness; and difficulty of breathing is added when the bronchial mucous membrane is affected. Hay-fever is most commonly a disease of adult life, but it may ocen at all ages. It usually returns animally when the patient is subjected to the exciting cause, which is oftenest in the form of floating pollen of different grasses, although other things such as dust or hright sunlight may set up an attack. Three factors essential to the production of hay-fever are a nervous constitution or idiosynerasy, a local irritability, and an external exciting cause. The treatment to be successful must be directed to these: (1) improve the health by quinine, arsenic, or other tonics, and soothe the nervous state by brounde of potassium or antipyrin; (2) act locally by pungent inhalations, as iodine, or by the thermocantery; (3) linally remove the patient from the cause by sending him to the seaside or for a voyage. Sec Hay Ferer, by Sir Morell Mackenzie (4th ed. 1887).

Hayley, William, Cowper's biographer, was horn at Chichester, 9th November 1745, but aliandoned legal studies for a life of lettered leisure, living in London, at Eartham in Sussex, and lastly at Feltham, where he died 20th November 1820. Among his works are didactic Essays in verse on painting, on history, on epic poetry, The Triumphs of Temper: a Poem, some plays, a Life of Milton, a Life of Romney, and his most memorable monument, The Life of Cowper (1803; see Cowper). Memoirs of and by himself were published in 1823.

Haym, Rudolf, philosopher and writer, was born at Grünberg in Silesia on 5th October 1821. In 1848 he sat in the national assembly at Frankfort; but in 1851 he began to lecture on philosophy and German literature at Halle, and was eventually appointed professor there in 1868. He has written biographies of Wilhelm von Humboldt (1856), Hegel (1857), Schopenhauer (1864), and Herder (1877-85), as well as a useful monograph, Die Romantische Schule (1870).

Haynau, Julius Jakob, Baron von, an Austrian general, was born at Cassel, in Germany, 14th October 1786. Entering the Austrian service in 1801, he signalised bimself during the Italian campaigns of 1848-49 by his ruthless severity, especially at the capture of Brescia, where his flogging of women and other atrocities gained him the name of the 'Hyana of Brescia.' Haynau was engaged in the siege of Venice, when he was summoned by the emperor to Hungary, in May 1849, to take the supreme command of the forces in that country. The storming of Raab, his victory at Konorn, his occupation of Szegedin, and his victories on the Theiss contributed materially to the final success of the imperialists. But Haynau's atrocious severity towards the defeated Hungarians excited the detestation of Europe. Although appointed dictator of Hungary after its pacification, he was nevertheless dismissed in 1850 on account of the intractability of his character. In the same year, when visiting the

brewery of Messrs Barclay & Perkins, in Lenden, he was assaulted by the draymen, on account of his cruelty, and escaped with his life, but the loss of his moustache. Baron Schöulals, in a biography of his friend Haynau (Gratz, 1853), tries to exonerate his character, and asserts that he only acted in obedience to the orders of his masters. Haynau died at Vienna, March 14, 1853.

Hayne, Robert Young, an American statesman, born in South Carolina in 1791, was admitted to the bar in 1812, served in the war with Great Britain, and at its close returned to his practice in Charleston. He was a member of the state legislature in 1814-18, and became speaker, was attorney general of the state in 1818-22, and sat in the United States senate from 1823 to 1832. He was a vigerous opponent of protection, and in 1832 boldly supported in congress the doctrine of Nullification (q.v.). Daniel Webster's reply ranks among his ablest speeches. In November 1832 South Carolina adopted an ordinance of nullification, in December Hayne was elected governor, and the state prepared to resist the federal power by force of arms. A compromise, however, was agreed to (see Jackson), and the ordinance was repealed. Hayne died 24th Soptember 1839.

May River, a feeder of Great Slave Lake in the Canadian North-west. In its course, northcast to the southern shore of the lake, it descends the two Alexandra Falls, about 250 feet high and 300 yards wide.

Hayti, or Harri ('mountainous country,'otherwiso HISPANIOLA, or SANTO DOMINGO), is, after Cuba, the largest of the West Indian Islands, now divided into the independent states of Hayti and the Dominican Republic (q.v.). For the man, see West Indies. It is nearly equidistant from Porto Rico on the E., and from Coha and Jamaica on the W., with the Caribbean Sea on the S., on the Will the Bahamas and the open accan on the N. Hayti lies between 17° 37′ and 20° N. lat, and between 68° 20′ and 74° 28′ W. long. It belongs to the group of the Greater Antilles, and, like all the principal members of its series, its greatest length (about 400 miles) is in the direction—from west to east-of the chain of which it forms a part; its greatest breadth is 160 miles. Area, including the islands of Tortuga, Gonaivo, &c., about 28,820 sq. m., or nearly that of Scotland. The country is mountainous, being traversed longitudinally by northern, central, and sonthern ridges, terminating in headlands on either enast; but between these ranges are wide and fertile plains. There are no active volcanoes in the island, but earthquakes are frequent. The highest peak is Loma Tina (10,300 feet), and in the middle section of the Sierra del feet), and in the middle section of the Sterm are Cibao the average height is 7000 feet. The climate is hot and moist in the lowlands, the tomperature at Port-an-Prince ranging from 67° to 104° F.; the mean range in the highlands is from 60° to 76° F. The heaviest rains are in May and June, and occaning the highlands of the island. Agriculture is sional hurricanes visit the island. Agriculture is very backward, although Hayti is one of the most fertile spots in the West Indies; while its excellent harbours, more especially those in the Gulf of Counive on the west, offer considerable facilities to foreign trade. The mountains are clothed with forests of pino and oak, and the island is rich in maliogany, satinwood, rosewood, and other valuable timbers. Cotten, rice, maize, occoa, ginger, arrowroot, yams, tobacco, and numerous fruits are indigeneus; and the mango, bread-fruit, sugar, coffee, and indigo are also produced. The minerals are now little worked, though some gold-washing is still carried on in the streams descending the northern slope of the Cibao. The rivers are inconsiderable, and useless for navigation. The largest lake, besides several bodies of fresh water, is the salt lake of Enriquillo, 25 miles inland from the south shore. Both rivers and lakes abound in caymans as well as lish. Birds are few, but reptiles and insects are numerous; the agenti is the largest wild manual.

numerous; the agent is the largest wild mammal. Hayti was discovered in 1492 by Celumbus, who landed here on 6th December; and within little more than one generation the aborigines had been swept away by the remorseless crucities of the Spaniards. Their place was filled with negre slaves, who were introduced as early as 1505. Next camo the Buccanoers (q.v.), who settled in the island of Tortnga, and ultimately gained a footing on the mainland; and, as those maranders were chiefly French, the western portion of Hayti, which was their favourite hannt, was in 1697 ecded to France by the peace of Ryswick, thus presenting the first important break in the unity of Spanish America. For nearly a hundred years the intruders imported vast reinforcements of Africans; while the mulattoes, who were a natural incident of the conconitant license, rapidly grew, both socially and politically, into an intermediate caste, being at once uniformly excluded from citizenship and generally excumpted from bondage. In 1791, under the infinence of the French Revolution, the mutual antipathies of the three classes—white, black, and unixed—burst forth into what may well be characterised as the most vindictive struggle on record—a struggle which, before the close of the 18th century, led to the externination of the once dominant Europeans, and the independence of the colemed insurgents. Thus, as the emancipated bondmen mostly belonged, at least in form, to the Church of Rome, Hayti now exhibited the only Christian community of negro blood on either side of the Atlantic. In 1801 France sont ont a powerful armament to recover her revolted dependency, treacherously seizing and deporting the deliverer of his brethren, Toussaint l'Ouverture (q.v.). In 1803, however, she was constrained to relinquish her attempt; and in 1804 Dessaliues, aping the example of Napoleon, proclaimed himself Emperor of Hayti, thus reviving the indigenous name of the three lumdred years

This great change was fatal to the commercial prosperity of French Hayti, decidedly the more vulnable section of the island. In its progress it had destroyed capital in every shape; and in its issue it could not fail to paralyse labour under cirenustances where continuous exertion of any kind was equally irksome and superfinous. Nor was the political experience of the lately servile population more satisfactory than its conomical condition. Sometimes consolidated into one state, and sometimes divided into two the country alternated times divided into two, the country alternated, through the instrumentality of one revolution after another, between despotism and anarchy, between monarchy (more or less constitutional or imperial) and republicanism. Its only tranguil period of any duration coincided with the rule of President Boyer (q.v.), which subsisted from 1820 to 1843-its last twenty-one years comprising not merely the whole of French or Western Hayti, but likewise the Spanish or eastern portion of the island, whose inhalitants in 1843 formed themselves into the Dominican Ropublic (q.v.). Hayti, thus united, was in 1825 recognised even by France, on condition of paying 150 million francs, or £6,000,000, as a compensation to the former planters—a sum reduced in 1838 to sixty millions. The western portion of the island remained republican in its form of government until 1849, when its former president, the negro General Soulongue, preclaimed an empire, and assumed the title of Emperor Faustin I. In 1859, however a republic was again proclaimed and a new constitu-tion adopted, which was modified in 1867. Few

presidents have since been permitted to complete their term of office (four years), which has usually been cut short by revolutions. In 1889 General Hippolyte succeeded in the chief-magistracy General Legitium, whom he had driven out of the country. Sir Spenser St John's Hayti, or the Black Republic, gives a truthful picture, at once melancholy and Indicrous, of the utter savagery that is dominant in the western state. Official peculation, judicial murder, and utter corruption of every kind underlie the forms and titles of civilised government; the religion, nominally Christian, is largely vaudoux or serpent wurship, in which actual and horrible cannibalism is even now a most important element. Instead of progressing, the negro republicans have gone back to the lowest type of African barbarism.

The area of the western portion of the island, the negro republic of Hayti, is about 9200 sq. m.; the population was stated in 1888, somewhat extravagantly, at 960,000; it is probably under 600,000. The capital, Port-au-Prince, is reported to have 30,000 inhabitants, and perhaps has 20,000. Under the president are a senate and house of representatives, and four heads of departments. The returns of income and expenditure are merely estimates, and the disorders of civil war have in recent years rendered these more than usually valueless. There is a large floating debt, chiefly resulting from the issue of paper money by successive governments. No interest had for years been paid on a debt of over a million and a quarter pounds sterling, consisting mainly of liabilities incurred to France; but in 1875 a fresh loan was effected of £3,338,120. The army consists nominally of 6828 men, mostly infantry; a gunboat and a few other vessels constitute the navy. The dialect of the people is a debased French. The exports of Hayti amounted in 1887 to 10,185,366 piastres (nominal value, 4s.); the chief articles are cuffee, cacao, logwood, malogany, and cotton. Of the imports, valued at 6,845,597 piastres, over two-thirds came from the United States, and about one-tenth each from Germany, France, and Britain.

See St John, Hayti, or the Black Republic (1884; 2d ed. 1889); works by Janvier (Paris, 1883-85-86) and La Selve (1876-81); Nau, Agronomie et Agriculture en Haïti (Paris, 1886); and Fortunat, Nouvelle Géographie de l'île

d'Haiti (Port-an-Prince, 1888).

Hayward, Abraham, essayist and talker, waborn at Wishford, in Wiltshire, 31st October 1802. He had neither public school nor university education, but after keeping terms at the Inner Temple was called to the har in 1832. His leanings were, however, more to letters than to law, yet he founded and edited the Law Magazine, and to every one's surprise was made Q.C. by Lord Lyndhurst in 1845. He published in 1833 his excellent prose translation of the first part of Faust, and soon became a busy contributor to the newspapers and magazines, especially the Quarterly Review, in which readers soon learned to recognise his persunality in an unusual combination of vivacity, epigrammatic verve, and critical acumen. By his brilliant conversation, his wealth of anecdotes, his whist-playing, and his artistic interest in 'the art of dining' he delighted society almost down to his death, at London, February 2, 1884. Many of his best articles were reprinted in his Biographical and Critical Essays (2 vols. 1858), the second series (2 vols. 1873), and the third (1 vol. 1873); and in Stetches of Eminent Statesmen and Writers (2 vols. 1880). Other books were Autobiography and Renains of Mrs Piozzi (2 vols. 1861), Selections from the Diary of a Lady of Quality—Sir Watkin Wynne's daughter (1864), and a somewhat perfunctory book on Goethe, in 'Foreign Classics for English Readers' (1877). His little books—The Art of Dining (1852), Lord

Chesterfield and George Selwyn (both in 1856), and Short Rules of Modern Whist (1878)—were widely circulated. In 1878 he published in two volumes his Selected Essays. His Select Correspondence was given to the world in two volumes in 1886.

given to the world in two volumes in ISS6.

Hazard, a game with two dice. The caster calls 5, 6, 7, 8, or 9 for the main. He then throws. If he throws the number called, or if he throws 12 when 6 or 8 is the main, or 11 when 7 is the main, he nicks, and wins of his opponent (named the setter). If he throws 2, 3, 11, or 12 when 5 or 9 is the main, or 2, 3, or 11 when 6 or 8 is the main, or 2, 3, or 12 when 7 is the main, he loses. If he throws any other mumber—thus, when 7 is the main, if he throws 4, 5, 6, 8, 9, or 10—it is called his chance. He then continues to throw until either the main or the chance is thrown. If the main is first thrown, the setter wins; if the chance is first thrown, the easter wins;

Hazaribagh, chief town of the district of the same name in the division of Chota Nagpore, Bengal. It is really a cluster of hamlets, which sprung up round the former military bazaar, with tilled fields between; the European troops have now for some years been withdrawn. Pop. 15,306.—Hazaribagh district has an area of 7021 sq. m., and a pop. (1881) of 1,104,742, mainly Hindus.

Hazebrouck, a town in the French department of Nord, 28 miles WNW. of Lille by rail. The parish church (1493-1520) is surmounted by a spire of open work, 260 feet high. There are some linen and tobacco manufactures. Pop. 7680.

Hazel (Corylus), a genus of trees of the natural order Cupulifere, of which the fruit is a unt in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins: the female flowers appear as mere elusters of coloured styles at the extremitics of buds.—The Common Hazel (C. Avellana) is a low



Common Hazel (Corylus Avellana): a, male and b, female flowers; c, fruit.

tree, a native of Britain, and of all the temperate parts of Europe and Asia; it is common also in North America. There are ten or twelve improved varieties cultivated extensively in Kent, especially around Maidstone and in some other parts of England. Of these there are two types—one with round nuts, named cobs; the other with elongated nuts, named filberts. The cup or involuce of the former is shorter, more open, and not so much lacerated as that of the latter. Of either type there is a variety in which the pellicle enclosing the kernel

is deep red; and both of these are highly esteemed. These particular varieties are propagated by suckers which are more or less freely produced, by layers, and by budding and grafting. The tree is extensively grown in some parts of England for coppicewood, being reared for this purpose from seed. The young straight stems and branches are employed for making crates, baskets, hurdles, houps, stakes, &e.; and the larger wood for charcoal, which is in great request for forges, for the manufacture of guu-powder and actists crayons. Chips of the wood are in Italy sometimes put in turbid wine for the purpose of fining it; and the roots are used by cabinetmakers for veneering. Magical properties have been a cribed to hazel rods by the credulous, as it was of them the Divining-rod (q.v.) was formed for the purpose of discovering water, minerals, or buried treasure. From the wood an empyreumatic oil is extracted, which is a vermifuge, and alleged to be a cure for toothache. Hazel-nuts yield, on pressure, about half their weight of a bland fixed oil, often ealled nut-oil in Britain, the hazel-nut being popularly known by the term nut alone; but in Germany it is wahme oil which is usually called nut-ail. Hazel-nut oil has drying properties, and is much used by painters; it is also used by perfumers as a basis with which to mix expensive fragrant oils; and it has been employed medicinally in eaughs.

The larva of a weevil (Bulaninus nucum) feeds on the kernels of hazel-inits. The parent female makes a hole into the nut by means of her long snont, and there deposits an egg. Great numbers

of nuts are thus destroyed.

The Beaked Hazel (C. restrata), a species having a very hairy fruit-cup prolunged into a lung beak, is a native of the northern parts of America. kernel is sweet. -The Constantinople Ifazel (C. columna), the nnts of which are considerably larger than those of the common hazel, is a native of the Levant, from which the fruit is imported into Britain. It is much used for expressing oil, but is a less pleasant fruit than many kinds of cob-nut and filher. A Himalayan species of hazel (C. ferow) has a spiny fruit-cup, and an oxcessively hard nut.—Barcolona nuts are the units of a variety of the common hazel, kiln-dried before their exportation from Spain. Hazel-nuts not subjected to this process cannot be kept long without losing in part their agreeable flavour, and contracting a sonsible rancicity, except in air-tight vessels, in which they are said to remain fresh even for years.

Hazleton, a borough of Ponnsylvania, 80 miles NNW. of Philadelphia, has ironworks, hunder-mills, and railway-car shups, but is of importance mainly as the chief business centre of the rich Lehigh coalfield. Pop. 7161.

Hazlitt, William, was born at Maidstone on April 10, 1778. His father was a Unitarian clergyman who belonged to the county of Antrim. fifteenth year he began to study in the Unitarian College at Hackney, with the view of hecoming a dissonting minister, a design which he early abandoned. In 1798 he formed the acquaintance of Coleridge, who encouraged him to compose his Essay on the Principles of Human Action ('the only thing,' he said, 'which I ever piqued myself upon writing'), which was not published, however, until 1805. For some time he endeavoured to earn alwing as a posteric periods. a living as a portrait-painter; and, according to Northeote, would have become a great artist had he not forsaken his easel for his desk. In 1806 he published his Free Thoughts on Public Affairs, and in 1807 his Reply to the Essay on Population by the Rev. T. R. Multhus. After his marriage with Miss Stoddart in 1808 he lived at the village of Winsterlow, in Wiltshire, until 1812, when he removed to York Street, Westminster, and found employment

as a writer on the Morning Chronicle and Examiner From 1814 to 1830 he contributed to the Edinburgh Review. His Round Table: a Collection of Essays on Literature, Men, and Munners, and the most popular of his works, his Characters of Shukespeare's Plays, appeared in 1817. Between 1818 and 1821 he delivered lectures at the Surrey Institute, which were afterwards published under the titles Lectures on the English Poets, on the English Conic Writers, and on the Dramatic Literature of the Age of Elizabeth. His marriage proved an unhappy one, and, after living for some time apart, Hazhitt and his wife were divorced in 1822. He was fond of retirhigh-road from London to Salisbury. At this lonely inn, which stands amid bleak wolds on the verge of Salisbury Plain, he wrote most of the essays which he contributed to the London Magazine, and which were afterwards republished in his Table Talk (1821) and Plain Speaker (1826). An unfortunate passion for the daughter of a tailor with whom he ladged found expression in the Liber Amoris, or the New Pyymalion (1823), a book of a strong though painful interest. In 1824 he manied a lady of some means, who travelled with him to Italy, or some means, who travened with min to tray, but left him, for eauses which can only be conjectured, during the return journey, and never joined him again. His Selections from the English Poets and Sketches of the Principal Picture Galleries in England appeared in 1824; his Spirit of the Age, or Contemporary Portraits, which some critics consider the ripost in thought and most felicitons in style of all his works, in 1825; and his Lyfe of Napoleon Bonaparte in 1828-30. His last years were darkened by ill-health and money difficulties. He died on September 18, 1830.

Wayward and irascible, a prey to melanchely, and too often the victim of a rash and haughty selfconfidence, Hazlitt was at bottom generous, ardent, and sincere. But his defects were sharpened by unsuccess, and above all by the scurrilous malignity with which his character and his writings were traduced by hired libellers of adverse politics. The scope of his powers was never recognised by his contemporaries, though, as Thackerry has said, there were probably not in all England twelve men with powers so varied. His genins had many facets. He excelled in description and in narrative, in reflection and in critical analysis. wrote of unture and of art and the characters of men; as a critic of the drama he has never been equalled. He was one of the deadlest controversialists, a master of epigram and burning invective and withering irony. His letter to William Gillard stands unsurpassed as an example of polished vituperation. His judgment was at times clouded by prejudice and distorted by his love of para-dox. But of all the Georgian critics he was the most elognent, the most entholic, the most thoroughly equipped. He never wrote in cold blood; he welcomed excellence everywhere. He did justice alike to the Lakers and to the Queen Anne men. He was not less discriminating than enthusiastic. His style ranges from lively gossip to glowing rhapsody; at its best it touches one of the high-water marks of English, it is at once so vigorous and so graceful, so heid and so rich, so exquisitely apt are the epithets, so firmly built are the sentences, so noble is the rhythm of the periods, His autobiographic essays are perhaps of all his works the most delightful—stamped with the scal of truth, trenulous with pathos, and bathed in the light of poetic imagination. His writings have never gained the recognition they merit; yet, with all his defects, it would be hard to point to Hazlitt's works at Taydiah pathos.

See G. Saintsbury's article in Macmillan's Magazine for 1887; Leslie Stephen's Hours in a Library (2d

master in all the ranks of English critics.

series, 1877); and Bulwer Lytton's Quarterly Essays (1875). A collection of Hazlitt's works in 7 volsevalusive of the Life of Napoleon—edited by his grandson, W. C. Hazlitt, has been published by Messrs Bell & Daldy. Alexander Ireland has issued an annotated List of his writings (1868), and an admirable selection from his writings, with a brief essay on his hfe, &c. (1889).

Head. See Brain, Concussion, Ear, Eye, Skull, Teeth, &c.

Head, SIR EDMUND WALKER, Bart., governorgeneral of Canada, was the son of the Rev. Sir John Head, and was born in 1805. near Maidstone, Kent. From Winchester he passed to Oriel College, Oxford, where he took a first in classics in 1827, and became a Fellow of Merton; in 1838 he succeeded his father, the seventh baronet. After serving as poor-law commissioner, he became in 1847 lientenant-governor of New Brunswick, and held this post until September 1854, when he succeeded the Earl of Eigin as governor-general of Canada. He retired in 1861, was made a civil-service commissioner in 1863, and privy-conneillor in 1867. He wrote a Handbook of Spanish Painting, and other popular books on art, and published Ballads and other Poems, original and translated (1868). He died 28th January 1868.

Head, Sir Francis Bond, Bart., anthor, and governor of Upper Canada, was born at Hermitage, near Rochester, 1st January 1793. He entered the corps of Royal Engineers, served at Waterloo and Fleurus, and had attained the rank of major when he retired from the service. In 1825 he accepted an engagement from a private company to work some gold and silver mines on the river Plate; and his spirited Rough Notes of his travels across the pannas and over the Andes gained for him the name of 'Galloping Head.' In 1835 he became governor of Upper Canada, where, at the head of the militia, he succeeded in suppressing an insurrection, which had its origin, as it was said, in his injudicious measures; but this charge he may fairly be held to have refuted in his Narrative (1839) of these events. In 1837 he resigned his post, and was created a baronet in 1838. After his retirement he devoted himself to literary pursuits, and for some years enjoyed a pension of £100 'for his services to literature.' His books include Bubbles from the Brunnen of Nassau, A Fagget of French Sticks, Stokers and Pokers, A Visit to Ireland, The Emigrant, The Horse and his Rider, The Royal Engineer, and Lives of Bruce, the traveller, and Sir John Burgoyne. He died 20th July 1875.

Headache can scarcely ever be called a disease, but it is a common symptom of many ailments. It is sometimes caused by scrious mischief within the cranium, but far more frequently it depends upon an alteration in the quality of the blood, or in a deficient or excessive supply of it to the head. The deterioration in quality may be caused by fevers, by inflammations of various organs—e.g. the kidneys, or even by breathing the air of a crowdedroom. The congestive form of headache is often produced by mere mechanical obstruction to the return of blood from the head. A tight collar or an awkward position of the neck during rest may cause it. This form of headache is aggravated by stooping. On the other hand the amenic variety is often relieved by lying down. The neuralgic headache is one of the commonest of all, and is especially associated with the hysterical tendency. Another variety which is on the increase in this lurried and hard-driven generation is that caused by excessive brain-work. Lastly, there is the sick headache, megrim or migraine, which comes on periodically in paroxysms, often associated with billious vomiting.

The great rule for the treatment of headache is first of all to correct the general morbid condition on which it depends. Without this, local treatment is usually of little avail, and at best is only of temporary benefit. Except in anomic cases the patient should have the head and shoulders well raised during sleep. Aperients give relief in nearly every form except the neuralgic. If the blood is deteriorated it must be improved by inon, 15 to 20 drops of the tincture of the perchloride, three times a day. Quinine is of use in periodic headaches in doses of 2 or 3 grains, three or four times a day. In neuralgic pain about the forchead menthol rubbed on often gives speedy relief. Gelseminm and Indian hemp are useful internal remedies, but opium is of doubtful value. Bromide of potassium in 30-grain ploses may be given with the Indian hemp, if there is much restlessness. Of local applications chloroform and mustard are perhaps the most generally serviceable. In all cases the diet and habits of life should be carefully regulated.

Head Borough, an old term for the head of a borough, or high constable. See CONSTABLE.

Head-hunting. See DYAKS.

Head-money. See Poll-TAX.

Headon Beds. See OLIGOCENE SYSTEM.

Health. See Hygiene.

Health, Bill of, in Shipping, is a document carried by every British ship, nuless engaged in the coasting trade, or specially excupted. It is granted at home by the customs, and abroad by the British consular agent, or, if there is no such person, by a British merchant or foreign consul. When no contagions or infections disease is known to exist at the place of departme, the bill is 'clean;' when there is reason to fear the appearance of such disease, the bill is 'suspected;' when such disease actually exists, the bill is 'fonl.' The practice of other countries is identical. See QUARANTINE.

Health, BOARD OF. See PRIVY-COUNCIL.

Health-resorts, frequented for combating disease or invigorating the comparatively healthy, fall into several well-marked groups. (1) Seabathing quarters have long been in vogue amongst civilised nations, though the periodical exodus from eities is of modern origin. (2) The remedial and invigorating agency of mountain air has been more recently recognised, but is now fully established. Hence the popularity of many inland highland districts in Scotland, Switzerland, and Norway. (3) Curative wells—thermal, muriated, alkaline, sulphated, chalybeate, sulphureous, calcareous—have been frequented from the earliest times, and are found in many countries. The various kinds of water and their beneficial qualities are dealt with in the article Mineral Waters. (4) Climatic health-resorts at a high altitude, such as Davos Platz, Andermatt, Meran, &c., have of late come into favour because of their value for persons recovering from acute illness, and who are able to take active outdoor exercise; and specially for those in the carly stages of phthisis, or in chronic pluthisis mnaceompanied by fever or blood-spitting. When there is hamoptysis, such a climate is disadvantageous or dangerous—as it is also in cases of heart-disease, chronic bronchitis, and ehronic rheumatism. (5) Resilence for longer or shorter times in exceptionally temperate, mild, or warm climates is recommended for pulmonary diseases, particularly phthisis. Such favoured regions are Bournemouth, Torquay, and other places on the south coast of England and the Isle of Wight, the Riviera (Mentone, Nice, &c.), Hyères, Pozzuoli and other sheltered places in south Italy, Palermo, Madeira, Algiers, and Upper Egypt. Florida, southern California, and the

pine-woods of Georgia are in favour with Americans. The elimate of Colorado, bracing though not altogether mild, is also beneficial to bronchial and pulmonary weakness. In hot countries the sanitariams are usually cool hill-stations—thus, in India, Simla, Darjiling, Naini Tal, Utakamand, Paclimarhi. (6) Climatic resorts where additional help is obtained for special treatment—such as the grapo cure in phthisis (Meran), whey cure (Gais in canton Appenzell), and the goat's-milk, ewe-milk, or eow's-milk cure. The influence of the milk, or cow's milk cure. The influence of the pine-woods at Arcachon is supposed to be favourable to consumptive nations. Also such special devices as warm mud-baths, or the sun-hath care (exposure of the uncovered person to the sun's heat and light), as practised at Veldes in Carinthia. (7) Hydropathic establishments generally. (8) Sea-voyages may also be here noted, as suitable for persons in the early stages of phthisis, and in cases of norvous exhaustion. See BATH, HYDRO-PATHY, MINERAL WATERS; the articles on the PATHY, MINERAL WATERS; the RUIGIES on the most notable health-resorts; and Charteris, Health Resorts at Home and Abroad (1885); J. Burney Yeo, Chinato and Health Resorts (1885); Upont Gill's Dictionary of Watering Places (1885); and Fraser Rae's Austrian Health-resorts (1888).

Healths, Drinking of. See Toasts.

Hearing. See EAR.

Hearne, Thomas, an eminent English anti-gnary, was horn in 1678 in the parish of White quary, was horn in 1678 in the parish of White Waltham, Berkshire, and had his education at St Edmund Hall, Oxford, where he graduated B.A. in 1699. Two years later he was appointed to a post in the Bodleian Library, of which in 1712 he became second keeper. This office he was obliged to resign in 1716 from his inability to take the oaths to the government, but he continued to live at Oxford occupied entirely with his studies. He died 10th June 1735. Heavne compiled and edited no less than forty-one works, all stamped by painful and laberious learning, although poor in style and somewhat rambling in method. They are usually marred by the intrusion of irrelevant matter—even his Jacobitism crept into his prefaces; yet —even his Jacobitism crept into his prefaces; yet they remain solid contributions to hibliography, and their author deserved better than to be gilibeted in the Dunciad as a dull and dusty pedant.

the Dincical as a dull and dusty pedant.

His most important books were Reliquiæ Bodleiane (1703), Leland's Itinerary (9 vols. 1710-12), Leland's Collectanea (6 vols. 1715), A Collection of Curious Discourses upon English Antiquities (1720); and the editions of Camden's Annals (3 vols. 1717), Alured of Boverley (1716), William of Newburgh (1719), Fordun's Soutchronicon (1722), Robert of Gloucester's Chronicle (1724), and that of Peter Langtoft (1725). The Bibliotheea Hearniana was published in 1848; Reliquia Hearniane, by Philip Bliss, in 1857. The third volume of Remarks and Collections of Thomas Hearne appeared in 1880, edited by C. E. Doblo for the Oxford Historical Society. See Impartial Memorials of his life by several hands (1736), and the Lives of Ledand, Hearne, and Wood (Oxford, 1772).

Hearsay. See Evidence.

Mearse, or Herse (through Fr. from Lat. hirpex, 'a harrow'), the earriage in which the dead are emveyed to the grave, but originally the term applied to a triangular bar or framework with upright spikes for holding candles at a church service, and especially at funeral services. eriginally very simple in form, but in the 15th and 16th centuries heurses of great splendour came into use, and were creeted in the churches over the hedies of distinguished personages. The framework was of iron or brass, sometimes of beautiful workmanship, square, octagonal, &e. in plan, with pillars at the angles, and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, and lighted up with

hundreds of wax candles, and decerated with wax From this the transition te the medern funeral hearse can be easily traced. In Catholic churches the old hearse still exists as a triangle with spikes, on which candles are placed.

Heart, the central organ of the circulatory system, acting as a force and suction pump in relation to the blood-vessels. It always lies dersally in Invertebrates, ventrally in Vertebrates, and arises from the strong development of one or more blood-vessels. In Vertebrates, the resulting cylinder, lying in the throat region of the embryo, is divided into receiving and expelling portions, is divided into receiving and expening portions, auricle and rentricle respectively, and the whole is enclosed in a more or less marked cavity or ensheathing double bag, the pericardium. By enrvature and folding, by formation of partitions and ingrowth of valves, the three or four chambered hearts of the higher vertebrates arise. It will be enough to describe the general structure and function of the heart in man,

and function of the neart in man.

The human heart lies ventrally in the chest, between the two lungs; it has a broad end or 'hase' directed upwards and backwards, and a pointed end or 'apex,' turned downwards, forwards, and to the left; it is kept in position by the attachment of the cuswathing pericardium to the upper surface of the Diaphragm (q.v.), and by the large blood-vessels which enter or leave its four chambers; its total size is approximately equal to that of its owner's closed list. There are two receiving chambers or arricles, of which the right receives all the inpure blood brought by the vence cave from head and body and by the coron-

ary vein from the substance of from the heart itself, while the left is filled with purified blood brought by the pulmonary veins from the lungs, The aurieles pass their contents to the two driving chambers or ventricles, of which the right pumps the impure blood to the lungs, and the left sends the mre blood to the head and body. The ventricles are larger than the auricles, and have strong museular walls proportionate to their harder The left work. ventriele is thau, stronger and partially sur-

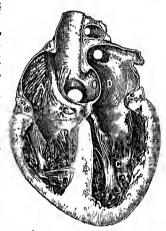


Fig. 1.—Section of the Human Heart (after His): Heart (after His):

A, right aurrele; B, right ventricle;
C, left ventricle; D, left auricle; E, partition between the two ventricles.
Between the auricles and ventricles on right and left, the tricuspid and mitral valves with their cords and associated muscles are shown.

rounded by, the thinner right chamber. The right auricle opens into the right ventricle by an aperture gnarded by a triple (tricuspia) valve, whose three membranous lappets are attached to tendinous eerds (chorder tendinea) tarising from muscular processes (musculi papillares) en the walls of the ventriele. The epening from the left anriele into the left ventriele is similarly guarded by a double (mitral or bicuspid) valve. These valves on each side prevent the passage of blood from ventriele to auricle. At the hase of the pulmonary artery on the light and of the aorta on the left, there are three pecketlike (semilunar) valves, which prevent backflow from vessels to ventricles.

When the heart is at work, the simultaneous contraction of the two auricles (i.e. of the muscle fibres on their walls) is followed by a similar contraction of the ventricles, and this by a panse or passive interval of re-expansion, after which the rhythm of contraction recommences. In the contraction of the anricles, the mass of blood in the large veins will not permit of a backflow in a peripheral direction, so that virtually all the contents of the auricles pass into the respective ventricles, which at that moment are flaccid and uncontracted. the ventricles fill, the valves between them and the auricles are partly closed, and this is perfectly accomplished when the contraction of the ventricle sets in.

no blood can

then pass back

from ventricle

to auricle, the

energy of ventricular

overcoming the resistance of the semilunar valves

guarding the

ary artery and

moreover

elastic vessels full of blood.

The state of

contraction in

auricle or ventricle is called

the systole; the state of

aorta,

are

traction

directed

entrance the pulmon-

the which con-

to

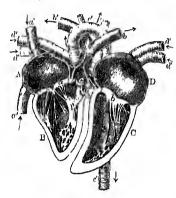


Fig. 2.—Diagram of Heart halved and laid open (after Debierre):

laid Open (after Deoigne):

A, B, G, D, as in fig. 1. a, part of tricuspid valve; b, part of mitral; c, semilimans at base of pulmonary artery. a',a', inferior and superior vene cave entering A, b',b', pulmonary arteries proceeding from B; c',t', acrts proceeding from C; d',d', pulmonary veins entering D.

passive relaxation and expansion the diastole, and it is evident that by the systole of the auricles the ventricles are filled, and that by the systole of the ventricles their contents are for the most part forced into the arterial systems of lungs and body. As the heart usually beats about seventy-two times a minute, the eyelc of events just noted lasts about 15 this of a second, of which the systole of the ventricle lasts about 3 this, that of the auricle perhaps $\frac{1}{4}$ th, and the passive interval about $\frac{1}{4}$ ths of a second.

The activity of the heart has several external indices, such as the beating, seen and felt between the fifth and sixth rib on the left side, due to contraction of the ventricles, which makes the 'apex' of the heart strike against the pericardinm, and through this on the wall of the chest. There are also sounds produced by the heart: (a) the longish dull sound probably caused by the contraction of the muscular fibres of the ventricles and the tension of the valves between these chambers and the anricle; (b) the sharp sound due to the sudden closure of the semilunar valves when the contrac-tion of the ventricles ceases. The heart sounds tion of the semmunar valves when the contraction of the ventricles ceases. The heart sounds are of great importance in the diagnosis of disease of the heart. They may undergo various changes and may in some cases disappear or be replaced by or accompanied by murmurs. These murmurs are caused by the blood flowing through the orifices of the heart which have become changed by disease. At a distance from the heart, the pulse or regular dilatation of an elastic artery is a familiar index. The heart is under the control of three sets of nerves: (a) from ganglia in its own substance,

apparently essential to the regular rhythm of contraction; (b) from the sympathetic system, apparently affecting rapidity of action; (c) from the pnenmogastric or vagus nerve, coming directly from the brain, apparently with arresting power. See AORTA, ARTERY, BLOOD, CIRCULATION; text-books of Anatomy by Quain, Turner, Mivart, Macalister, &c.; of Physiology by Foster, Huxley, Landois and Stirling, &c.
DISEASES OF THE HEART are either those affect-

ing the various tissues composing the heart, or the nervous arrangements governing the heart.

(1) Discuses of Structures composing Heart may he primary or secondary,

(a) Primary Discusce.—All the various tissues of the heart may be primarily affected. The Pericardium (sac surrounding heart) may be affected with inflammation (pericarditis). This is by no means an uncommon condition in rheumatic fever, while it also occurs in connection with some of the acute exanthemata. Fluid tends to be effused into the sae, and this produces great impairment of the heart's action. The condition frequently leads to a fatal termination. Various tumours may occur in

connection with the pericardium.

The Myocardium (unuscular wall of heart) may also be affected with inflammation leading to very irregular and impaired action of the heart, and often to death. This is known as myocarditis, and if the fatal termination does not ensue in the acute stage of the disease, the wall of the heart is apt to be left in a weakened condition due to the pathological changes set up in the course of the inflammation. The invocadium may occasionally be the seat of tumours. The muscular substance of the heart may undergo a futty degeneration, which may produce death either from failure of the heart,

or more rarely by rupture of the wall.

The Endocardium (lining membrane of heart; also forms the valves of the heart) is the most common seat of inflammation in rheumatic subjeets and in individuals suffering from scarlet fever or from some other of the exauthemata. This endocarditis is specially apt to attack the valves of the left side of the heart, and to lead to deformity and the imperfect action of these important stud-When this occurs the well-known train of tures. symptoms commonly associated with heart disease are apt to appear—breathlessness, palpitations, irregular heart's action, dropsy, albuminuria, &c.; while the various signs of valvular disease, among the most important of which is the alteration in the sounds of the heart, and the development of nur-murs may also be determined. In many cases, however, in spite of disease of the valves, the heart may continue to act satisfactorily. But there is always a great danger of its proving inadequate to the additional work thus put upon it, and of its suddenly failing under any extra strain.

There is one peculiar form of inflammation of the endocardium known as acute ulcerative endocarditis which is exceedingly fatal, and which is due to the development of micro-organisms in the heart. Certain slow degenerative changes may also affect

the endocardium, more especially where it composes the aortic valves (Atheroma).

In all inflammatory affections of the heart there is a tendency for all the structures to be involved

at one and the same time.

(b) Secondary Diseases.—As the result of various morbid states of other parts of the body, the heart, and more especially its muscular wall, may become secondarily affected. Thus in fever the contemporary explicit and the heart applicable to the secondarily affected. muscular substance of the heart manifests the condition of cloudy swelling, and thus becoming weak-ened tends to yield to the pressure of blood inside the heart, and to undergo dilatation. This state of the organ is frequently accompanied by the development of marmins due to the imperfect action of the valves between the auricles and ventricles allowing the blood to flow backwards through the orifices. At the same time the various symptoms of disturbed circulation are developed.

In the various forms of *anamia* (bloodlessness), whether primary or secondary to other diseases, the muscle of the heart becomes debilitated, and a similar series of signs and symptoms to those just

described make their appearance.

In certain diseases in which the blood pressure is raised (Bright's Disease), or when any condition throws extra work on the heart for a considerable period, the organ becomes hypertrophica—i.e. increased in size and strength. This is well seen when the valves are diseased, and the muscular substance is well nourished.

(2) Darungements of Nervous Mechanism of Heart.—As a result of many totally different conditions the sensory nervous mechanism of the heart may be affected, and give rise to pain or to various sensations in the region of the heart. These sensations are not, however, always indicative of organic

discase of the organ.

A peculiar set of symptoms, known as angina nectoris, are treated more fully under a separate head. The patient suffers from attacks, the chief symptom of which is a dreadful feeling of impending death, usually with cardiac pain. When accurring as the result of organic heart disease these symptoms are most commonly connected with disease of the acretic valves.

disease of the aortic valves.

The various nervous arrangements presiding over the mayoments of the heart may also become deranged, and lead to increased or diminished heart's action or to irregular action. The last is the most frequent, and is a very common accompaniment of organic disease, though it frequently occurs in individuals entirely free of any such condition. Nervous and gouty individuals and those addicted to the excessive use of tobacco are common sufferors

from such palpitations.

The words 'broken heart' seem to suggest a form of heart disease. But of course the expression aroso out of the long prevalent and now wholly obsolute view that the heart is in some way the seat of the affections—a view inevitably suggested by the quickoning of the pulso under emotion, or its temporary stoppage from a sudden shock.

Heart, SACRED. See SACRED HEART.

Heart-burial, or the burial of the heart in a place separate from that in which the body is haid, seems to have been once practised by the ancient Egyptians. In European countries it was most common in the 12th and 13th centuries, though instances have occurred in all centuries down to and including the 19th. The practice undoubtedly arose out of the special veneration in which the heart was held as the seat of the affections and of certain of the higher virtues, as courage, piety. Besides the heart, other parts of the body, such as the viscera, were sametimes honoured with separate burial. It has been suggested that this distribution of the body for sepultare was prompted by a wish to secure the prayers of more than one congregation for the soul of the deceased. In other instances, where the deceased has died abroad and his heart has been carried home for burial, the motivo is simpler to understand. The persons who have been honoured with separate burial for the heart have been for the most part men and women of royal birth and ecclesiastics of high rank. Amongst royal personages may be enumerated Henry I. and Richard I. of England, whose heart were interred at Rouen; Henry III., whose heart was buried at Fontevrand in Normandy; Eleanor, wife of Edward I., at Lincoln; Edward I. himself,

whose heart was sent to Jerusalem for burial, as was that of Robert Bruce (q.v.); the French kings, Lonis XII., XIII., and XIV., Francis I. and II., and Henry II. and III.; the Emperor Leopold of Anstria; and James II. of England, whose heart was entombed in St Mary of Chaillot near Paris. The heart of Anne de Montmorency, constable of France, was interred at Les Célestins; that of Lord Edward Bruce at Chross Abbey in Perthshire, his bedy in Bergen-op-Zoom in Holland; and that of Sir William Temple at Moor Park near Famham. The viscera of the popes from Sixtus V. (1590) onwards were interred in SS. Vincenzo and Anastasia, the parish church of the Quirinal. In the 19th century the best-known cases at chose of Daniel O'Connell, the poet Shelley ("cor cordium"), and Kellermann, the French marshal. The hearts of the first two were lunied in Rome, that of the last on the buttlefield of Valmy. The practice was prohibited by Pope Boniface VIII. (1294–1303) under sentence of excommunication; but the prohibition was removed by his successor Benedict XI., at all events so far as the Fronch royal family was concerned. See Pettigrew, Chronicles of the Tombs (1857), pp. 249 cf seq.

Heart-burn. See Indicestion.

Hearth-money, an unpopular tax of two shillings levied on every hearth in all houses 'paying to church and poor;' first imposed in 1603, and abolished in 1689.

Heart's Content, a port of Nowfoundland, on the east side of Trinity Bay, with 900 inhabitants. Two Atlantic cables land here.

Heart's-ease. See VIOLET.

Heat, the cause of the sensation of warmth, and of a multitude of common phenomena in nature and art. In considering this subject scientifically it is necessary from the entset to discard the ideas conveyed by the papular use of such words as hot and cold. A number of hodies, however different, left for a long enough time in the same room, must, as we shall see further on, acquire the same room, must, as we shall see further on, acquire the same room, pupular as we shall see further on, acquire the same room, must, as we shall see further on, acquire the same room, as we shall see further on, acquire and the popular language some, as metals, stones, &c., are pronounced to be cold, and others, as flaunch and further of a lody.

Nature of Heat.—A heated body is no heavier than it was bofore it was heated; if, therefore, heat be a material substance, as it was long considered, it must be imponderable. And, in fact, under the name of caloric, it is classed in almost all but modern treatises as one of the family of imponderables. But if it were matter, in any sense of the word, its quantity would be unchangeable by human agency. Now we find that there are cases in which heat is produced in any quantity without flame, combustion, &c., as in melting two pieces of ice by rubbing them together, and also cases in which a quantity of heat totally disappears. This is uttorly inconsistent with the idea of the materiality of heat. The only hypothesis that at all accords with the phenomena is that heat depends upon motion of the particles of a body, heing in fact Energy (q.v.), not matter; and with this idea we shall start.

Temperature.—When two bodies are placed in contact, heat will in general pass from one to the other, with the effect of cooling the first and warming the second. This process goes on until the two acquire the same temperature. Thus temperature is a condition of a body, determining, as it were, the head of the heat which the hody contains—to take the obvious analogy of water in a eistern or a mill-pond. In this sense it is analogous also to the pressure of gas in a receiver, or to the potential in

an electrified conductor. By the help of the 'specific heat' of bodies (which will be treated later) we can determine from their change of temperature how much heat they gain or lose. The scientific or absolute measurement of temperature can only be alluded to here. It depends upon theoretical con-

siderations, for which see THERMO-DYNAMICS.

Measure of Heat.—Whether it he a vibration, such as light and sound (as in some cases it certainly is), or consist in independent motions of the particles of a body, leading to a succession of impuets on each other and on the walls of the containing vessel (as is almost certainly the case in gases), it is none the less certain that the amount of heat in a body is to be measured by the energy of moving particles. But as we cannot observe those particles so as to ascertain their vis-viva, we must have as a preliminary some artificial unit in terms of which to measure heat. This will be terms of which to measure heat. This will be described later. But in order that this process may be applied we must have some means of measuring the temperature of a body, depending upon an effect Whatever that effect may be, it is obvious that, as the laws of nature are uniform, it will afford us a reproducible standard, by which we can estimate at any time and at any place an amount of heat, and compare that amount with another observed somewhere else; just as the French Mètre (q.v.) is reprodueible at any time, being (at least by its original definition) the ten-millionth part of

a quadrant of the meridian.

Dilutation or Expansion.—Now, one of the most general and notable effects which heat produces on matter is to expand it. The length of a metallic bar varies with every change of temperature, and is ever the same at the same temperature. The fixing of the tire of a cart-wheel is a very good instance. No hammering could fit an iron hoop so tightly on the weal weal of the wheel or does the tightly on the wood-work of the wheel as does the simple enlarging of the tire by heat, and its subsequent contraction by cold. It is thus possible to slip it on, and an enormous force is secured to bind the pieces together. In almost every kind of strueture the expansion and contraction from changes of temperature require to be guarded against. In the huge iron tubes of the Britannia Bridge the mere change of the seasons would have produced sufficient changes of length to tear the piers asunder, had each end of a tube been fixed to masonry. Watches and clocks, when not compensated (see PENDULUM), go faster in cold weather, and slower in hot, an immediate consequence of the expansion or contraction of their balance wheels and pendu-

If a flask full of water or of alcohol be dipped into hot water or held over a lamp, the flask is heated first, and for a moment appears not quite full, but as heat reaches the liquid it expands in turn, and to a greater degree than the flask, so that a portion of the liquid runs over; a glass shell which just floats in a vessel of water, sinks to the which just hoats in a vessel of water, sinks to the bottom when the water is heated; and as water is gradually heated from below, the hotter water continually rises to the surface. Indeed, if this were not the case, it would be impossible to prevent explosions every time we attempted to boil water or any other fluid. If a bladder, partly filled with air, and tightly tied at the neck, be heated before a first the exercised in will expend and the bladder. fire, the contained air will expand, and the bladder will be distended. As it cools it becomes flaceid

lums.

again by degrees.

These and like instances are sufficient to show us

These and like instances are sufficient to show us that in general all bodies expand by heat. In order, then, to prepare a reproducible means of measuring temperature, all we have to do is to fix upon a substance (mercury is that most commonly used) by whose changes of volume it is to be measured, and a reproducible temperature, or rather two reproducible

temperatures, at which to measure the volume. Those usually selected are—that at which water freezes, or ice melts, and that at which water boil-. In both of these cases the water must be purc, as any addition of foreign matter in general changes the temperature at which freezing or boiling takes place. Another important circumstance is the height of the barometer (see BOLLING). The second reproducible temperature is therefore defined as that of water boiling in an open vessel when the barometer stands at 30 inches. In absolute strictness, this should also be said of the freezing-point, but the effect on the latter of a change of barometric pressure is practically insensible. practical construction of a heat-measurer or there mometer on these principles, the various ways of graduating it, and how to convert the readings of one thermometer into those of another, are described in the article THERMOMETER. In the present article we suppose the Centigrale thermo-In the meter to be the one used.

If we make a number of thermometer tubes, fill them with different liquids, and graduate as in the Centigrade, we shall find that, though they all give 0° in freezing and 100° in boiling water, no two in general agree when placed in water between those states. Hence the rate of expansion is not generally uniform for equal increments of temperature. It has been found, however, by very delicate experiments, which cannot be more than alluded to here, that mercury expands nearly uniformly for equal increments of temperature. However, what we However, what we standard, but a resought was not an absolute standard, producible one; and mercury, in addition to furnishing this, may be assumed also to give us approximately the ratios of different increments of temperature.

We must next look a little more closely into the nature of dilatation by heat. And first, of its measure. A metallic rod of length lat 0° increases measure. A metaline roll of length l at l increases at l° by a quantity which is proportional to l and to l. Hence, l being some numerical quantity, the expanded length l' = l(1 + kl). Here l is called the coefficient of linear dilatation. For instance, a brass rod of length 1 foot at 0° becomes at l° (1 + .0000187t) feet; and here l, or the coefficient of linear dilatation for one degree (Centigrade), is 10000187t, or a brass rod has its length increased by '0000187; or a brass rod has its length increased by about one lifty-three thousandth part for each degree of temperature.

If we consider a bar (of brass, for instance) whose length, breadth, and depth are l, b, d—then, when heated, these increase proportionally. Hence

$$l' = l(1 + kt),$$

 $b' = b(1 + kt),$
 $d' = d(1 + kt),$

and therefore the volume of, or space occupied by, the bar increases from V or lbd to V' or l'b'd'.

Hence $V' = V(1 + kt)^{\circ}$, = V(1 + 3kt) nearly, since k is very small. Therefore we may write V' = V(1 + Kt), where we shall have as before K, the coefficient of cubical dilatation for 1° of temperature. And, as K = 3k, we see that, for the same substance, the coefficient of cubical dilatation is three times that of linear dilatation.

In the following table these coefficients are increased a hundredfold, as it gives the proportional increase of length for a rise of temperature from 0° to 100° Centigrade. It must also be remarked that, while the linear dilatation of solids is given, it is the cubical dilatation of liquids and gases which is necessarily given. Moreover, as the latter are always measured in glass, which itself dilates, the results are only apparent; they are too small, and require correction for the cubical dilatation of glass. This, however, is comparatively very

small, and a rough approximation to its value is usually sufficient.

Glass	00086	Water	-0432
Iron	00122	Water	·116
Zmc	10200	Air	-3665
Meicury	.01803	Air Hydrogen	3668

There is one specially remarkable exception to the law that bodies expand by heat—viz. that of water under certain circumstances. From 0° (Centigrade), at which it melts, it contracts as the tempera-ture is raised, up to about 4° C., after which it begins to expand like other bodies. We cannot here enter into spoculations as to the cause of this very singular phenomenon, but we will say a few words about its practical utility. Water, then, words about its practical ntility. Water, then, is densest or heaviest at 4° C. Hence, in cold weather, as the surface water of a lake coals to near 4°, it becomes heavier than the hotter water helow, and sinks to the bettom. This goes on till the whole lake has the temperature 4°. As the surface cooling proceeds further, the water becomes lighter, and therefore remains on the surface till it is frozen. Did water not possess this property, a severe winter might freeze a lake to the bottom, and the heat of summer might be insufficient to remelt it all.

Specific Heat.—The thermometer indicates the temperature of a body, but gives us no direct information as to the amount of heat it contains. this is measurable, for we may take as our UNIT the amount of heat required to raise a pound of water from 0° to 1°, which is of course a definite standard. As an instance of the question now raised—Is more leat (and if so, how much more) required to heat a panal of water from zero to 10° than to heat a pound of mercury between the same limits? We find by experiment that bodies differ extensively in the amount of heat (measured in the units before mentioned) required to produce equal

changes of temperature in them.

It is a result of experiment (sufficiently accurate for all ordinary purposes) that, if equal weights of water at different temperatures be mixed, the temperature of the mixture will be the arithmetic mean of the original temperatures. From this it follows, with the same degree of approximation, that equal successive amounts of beat are required to raise the same mass of water through successive degrees of temperature. As an instance, suppose one pound of water at 50° to be mixed with two pounds at 20°, the resulting temperature of the mixture is 30°; for the pound at 50° has lost 20 heat units, while each of the other two pounds has gained 10 such units, transferred of course from the hotter water. Generally, if m pounds of water at t degrees be mixed with M penuds at T degrees (the latter being the colder), and if θ he the temperature of the mixture -the number of units lost by the first is $m(t-\theta)$, since one is lost for each pound which cools by one degree; and that gained by the second is $M(\theta - T)$, and these must be equal. Hence $m(t - \theta) = M(\theta - T)$; whence, at once,

$$\theta = \frac{mt + MT}{m + M}.$$

But if we mix water and mercury at different temperatures, the resulting temperature is found not to agree with the above law. Hence it appears that to raise equal weights of different bodies through the same number of degrees of temperature requires different amounts of heat. And we may then define the specific heat of a substance as the number of units of heat (as above defined) required to raise the temperature of one pound of it by one degree. From the definition of a unit of heat it is at

ence seen that our numerical system is such that the specific heat of water is unity; and, in general, the specific heats of other bedies are less, and are

therefore to be expressed as proper fractions. Fer example, if equal weights of water and mercury be mixed, the first at 0°, the second at 100°, the be mixed, the first at 0°, the second at 100°, the resulting temperature will not be 50° (as it would have been had both bodies heen water), but 3°-23 nearly; in other words, the amount of heat which ruises the temperature of one pound of water 3°-23 is that which would raise that of one pound of incremy 96°-77, or the specific heat of mercury is $3\pi t \ln \sigma$ that of water. The following may be given as instances of the great differences which experiment has shown to exist among bodies in respect of specific heat : Water, 1 000; turpentine, 426; sulphur.

203; iron, '114; merenry, '033.

It is mainly to the great specific heat of water that we are indebted for the comparatively small amount of it required to cool a hot body dropped into it; for its comparatively small loss of temperathro when it is poured into a cold vessel; and for the enormous effects of the water of the ocean in

the coormons effects of the water of the ocean in modifying climate, as by the Gulf Stream.

It has been found generally that the specific heats of clementary solids are nearly inversely as their Atomic Weights (q.v.). Hence their atoms require the same amount of heat to produce the same change in their temperature. Thus, for simple bodies, we have atomic weight of merenry, 100; its exaction heat. 1933: product 3:3: atomic weight. bodies, we have atomic weight of merenry, 100; its specific heat, '033; product, 3.3; atomic weight of iron, 28; its specific heat, '114; product, 3.2. A similar remark may be made, it appears, with reference to compound bodies of any one type; but, in general, the product of the specific heat and the atomic weight differs from one type to another.

Latent Heat, Fusion, Solution, and Vaporisation.
-We are now prepared to consider the somewhat emplex effects produced by heat on the molecular constitution of bodies; and, conversely, the relations of solidity, fluidity, &c. to heat. All solid bodies (except carbon, which has been softened only) have been melted by exposure to a sufficiently high temporature. The laws of this fusion are:

(1) Every body has a definite meltiny-point, assignable on the thermometric scale, if the pressure to which

to the state members as set of the first it is subjected by the same.

(2) When a body is melting, it retains that fixed temperature, however much heat may be supplied, until the last particle is melted. The last result is most remarkable. The heat supplied does not raise the temperature, but produces the change of state. Hence it seemed to disappear, as far as the thermometer is concerned, and was therefore called

latent heat.

A pound of water at 79° C, added to a pound of water at 0° C, produces, of course, two pounds of water at 39° 5. But a pound of water at 79° C, added to a pound of ice at 0° C, produces two pounds of water at 0°. Heat, then, has disappeared in the production of a change from solidity to finishty. And this we might expect from the conservation of Europey (u, v), for convery in the shape of heat of Energy (q.v.), for energy in the shape of heat must be consumed in producing the potential energy of the molecular actions of the separate particles in the fluid. For every pound of ice melted, without change of temperature, 79 units of heat are thus converted into petential energy of molecular separation.

We give a few instances of latent heat of fusion: Water (as above), 79.0; zinc, 28.1; sulphur, 9.4; lead, 5.4; mercury, 2.8.

In law I it is mentioned that constancy of pressure is necessary. In fact, the freezing (or melting) point of water is lorered by increase of pressure, while those of sulphur or wax are raised; sure, while those of sulphur or wax are raisal; but these effects, though extremely remarkable, are very small. Most bodies contract on solidifying; but some, as water, east-iron, certain alloys, &c., capand. Thus a severe frest, setting in after

copious rain, splits rocks, &c., by the expansion of freezing water; and thus also we obtain in iron the most delicate and faithful copy of a mould, and in the fusible alloy a clear-cut copy of a type. The modern dynamical theory of heat (thermo-dynamics) enables us to see that a perpetual motion would be prognable if bodies which contract on solidifying had not their melting-point raised by pressure, and

vice versa.

Analogous to the fusion of a solid is its solution in a liquid, or the mutual conversion into liquids of two solids which are intimately mixed in powder. Here, also, we should expect kinetic energy, in the shape of heat, to be used up in producing the potential energy of the liquid state; and, indeed, such is always the case. Such changes of arrangement destroy heat or produce cold; but this in many cases is not the effect observed, as there is generally hard development of the content of the ally heat developed by the loss of potential energy if there be chemical action between the two substances. Hence, in general, the observed effect will be due to the difference of the heat generated by chemical action and that absorbed in change of state.

If a quantity of pounded nitrate of anunonia (a very soluble salt) be placed in a vessel, an equal weight of water added, and the whole stirred for a minute or two with a test-tube containing water, the heat required for the solution of the salt will be abstracted from all bodies in contact with the solution, and the water in the test-tube will be frozen. In this sense the arrangement is called a freezing micture. For additional illustrations of heat becoming latent, see FREEZING MIXTURES.

Of course the converse of this may be expected to hold, and latent heat to become sensible when a liquid becomes solid. As an example, when a supersaturated solution of sulphate of soda begins to deposit crystals of the salt with great rapidity the temperature rises very considerably; and it is the disengagement of latent heat that renders the freezing of a pond a slow process, even after the whole of the water has been reduced nearly to the

freezing-point,

Vaporisation,—Almost all that has been said on the subject of fusion is true of vaporisation, with the change of a word or two. Thus, however the change of a ward or two. Thus, however much heat we supply to a liquid, the temperature does not rise above the boiling-point. Heat, then, becomes latent in the act of vaparisation, or rather is converted into the potential energy involved in the change of state. It is found by experiment that 540 units of heat (each sufficient to heat a pound of water 1°C.) disappear in the couversion of a pound of water into steam. Hence a pound of steam at 100° C. is sufficient to raise 5.4 pounds of water from zero to the boilingpoint.

COMMUNICATION OF HEAT.—There are at least three distinct ways in which this occurs, and these

we will take in order.

Conduction.—Why is it that, if one end of a poker and of a glass or wooden rod be put into a fire, we can keep hold of the other end of the latter much longer than we can of the former? The reason is that heat is more readily transmitted in the iron from particle to particle than it is in glass or wood. This is conduction. It is to be noticed, however, that in this experiment a great portion of the heat which passes along each rod is given off into the air by the surface. The mathegiven off into the air by the surface. matical theory of conduction has been most exquisitely investigated by Fourier, but on the supposition that the rate at which heat passes from a warmer to a colder portion of a body is propor-tional to the *difference* of temperature. As most of the experiments which have been made with the object of ascertaining the conductivity (not |

conductibility, the erroneous word too commonly in use) of different bodies have been made in this way, it is not surprising that our knowledge on this point is very meagre indeed. We know that silver and copper conduct better than most other metals, and that the metals in general conduct better than other solids; but our further information is neither very extensive nor very definite. The first determinations of conductivity which are at all trustworthy are those of Forbes, method was immensely superior to those of his predecessors. Before we give one or two numerical data, we must explain what the numbers mean. The following definition is virtually that of Fourier:

The thermal conductivity of a substance is the number of units of heat which pass per unit of surface per unit of time, through a slab of unit thickness, whose sides are kept at temperatures differing by 1° C. Taking the unit of heat as above described, a foot as unit of length and a minute as described, a foot as unit of length and a minute as unit of time, the conductivity of iron is about 0.8, while that of copper varies from 4 to little more than 2. (Very slight impurities affect to a great extent both the thermal and the electric conductivity of copper.) Contrasted with these we find that the conductivity of rocks is very small, ranging from 0.015 to 0.04.

In conjunction with their radiating power (see next section), the conductivity of bodies is most important as regards their suitableness as articles of clothing for hot or cold climates, or as materials for building or furnishing dwelling-houses. We need but refer to the difference between linen and woollen clothing, or to the difference (in cold weather) of sensation between a carpet and a bare floor, in order to show how essential the greater or less conducting power of bodies is to our everyday

comfort.

countort.

Radiation.—By this is understood the passage of heat, not from particle to particle of one body, but through air or vacuum, and even through solid bodies (in a manner and with a velocity quite different from those of conduction) from one body to another. There can be no doubt whatever as to radiant heat being identical with light, differing from red light, for instance, as red light differs from blue—i.e. having (see Light) longer waves from blue—i.e. having (see LIGHT) longer waves than those corresponding to red light. This idea might easily have arisen during the contemplation of a body gradually heated. At first it remains dark, giving off only rays of heat; as its temperature increases it gives us, along with the heat, a low red light, which, by the increase of the temperature, is gradually accompanied by yellow, blue, &c. rays, and the incandescent body (a lime-ball, for instance) finally gives off a light as white as that of the sun, and which therefore contains all the colours of smulight in their usual proportions. In fact there is great reason to believe that the sun is merely a mass of incandescent matter, probably in the main gaseous, and that the radiations it cmits, whether called heat or light, merely differ in quality, not in kind. Taking this view of the subject at the outset, it will be instructive to compare the properties of radiant heat with those of light throughout. It must be understood when we make this comparison that the term heat is improperly used in this connection. Radiant heat is not heat in the ordinary sense of the word. It is a form of energy, a transformation of the heat of a hot body, and can be transformed into heat again when it is absorbed, but on its passage it is not what we ordinarily understand by the word heat

Light, then, moves (generally) in straight lines. This is easily verified in the case of heat by the use of the thermo-electric pile and its galvano-

Placing the pile out of the line from a source of heat to an aperture in a screen, no effect is observed; but deflection of the needle at onee occurs when the pile is placed in the line which light would have followed if substituted for the

A concave mirror, which would bring rays of light proceeding from a given point to a focus at another given point, does the same with heat, the hot body being substituted for the luminous one, and the pile placed at the foens. Heat, then, is reflected according to the same laws as light. burning lens gives a capital proof of the sun's heat and light being subject to the same laws of refrac-tion. When the solar Spectrum (q.v.) is formed by means of a prism of rock-salt (the reasons for the choice of this material will afterwards appear), the thermo-electric pile proves the existence of heat in all the coloured spaces, increasing, however, down to the red end of the spectrum, and attaining its maximum beyond the visible light, just as if radiant heat were (as it must be) light

with longer waves.

Some bodies, as glass, water, &c., transmit, when in thin plates, most of the light which falls on them; others, as wood, metal, coloured glass, Sec., transmit none or little. A plate of rock-salt, half an inch thick, transmits 96 per cont. of the rays of heat which fall on it; while glass, even of a thickness of one-tenth of an inch, transmits very little. In this sense, rock-salt is said to be diathermanous, while class is said to be adiathermanous, or only partially diathermanous. Most of the er only partially diathermanous. Most of the simple gases, such as oxygen, hydrogen, &c., and mixtures of these, such as air, oppose very little resistance to the passage of radiant heat; but the representations of the passage of t reverse is in general the case with compound gases. It has recently been asserted that water-vapour in particular is exceedingly adiathermanous. The question is one of very considerable difficulty, owing to the fact that it is almost impossible to experiment upon vapour alone. The presence of dust particles always produces deposition of water, which is a very good absorber of radiant heat

But there are other remarkable phenomena of radiant heat which are easily observed, and which have their analogy in the case of light. (1) Unstained glass seems equally transparent to all kinds of light. Such is the case with rock-salt and heat.

(2) Light which has passed through a blue glass (for instance) loses for less per cent, when it passes through a second plate of blue glass. Similarly heat loses (say) 75 per cent. in passing through and plate of crown-glass, and only 10 per cent. of the remainder (say) in passing through a second. (3) Blue light passes easily through a blue glass, which almost entirely arrests red light. So dark heat passes far less easily through glass than bright heat does. These analogies, mostly due to Melleni, are

verv remarkable.

Again, light can be doubly refracted, plane polarised, circularly polarised. All these properties have been found in radiant heat by Prin-

cipal Forbes.

The beautiful investigations of Stokes, Balfour Stewart, and Kirchheff have shown us that bodies which most easily absorb light of a particular colour give off most freely, when heated, light of that colour; and it is easily shown by experiment that those surfaces which absorb heat most readily also radiate it most readily. Thus, it was found by Leslie that when a tinned-iron cubo full of boilby Lesne that when a thined-fron endo fill of bottom water had one side polished, another roughened, a third covered with lampblack, &c., the polished side radiated little heat, the roughened more, while the blackened side radiated a very great quantity indeed. And again, that if we have (say) three similar thermometers, and if the

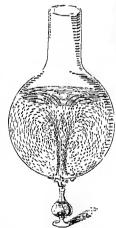
bulbs be (1) gilded, (2) covered with roughened metal, (3) smoked, and all be exposed to the same radiation of heat, their sensibility will be in the order 3, 2, 1. A practical illustration of this is seen in the fact that a bluekened kettle is that in which water is most speedily made to boil, while a polished one keeps the water longest warm when removed from the fire. Again, if a willow-pattern plate be heated white-hot in the fire, and then examined in a dark room, the pattern will be reversed—a white pattern being seen on a dark ground. It is this law of equality of radiating and absorbing powers that mainly gives like to the superior comfort of white clothing to black in winter as well as in summer; radiating less in

winter, it absorbs less in summer.

Much has been argued about the separate existence of cold, from such facts as these: A piece of ice held before the thermo-electric pile produces an opposite dellection of the galvanometer to that produced by a hot ball. If a freezing mixture be placed at one focus of a spheroidal mirror, and a thermometer with a blackened buil at the conjugate foens, the latter will fall speedily, though very far off from the mixture. Now, the true explanation of such observations is to be found in what is called the 'Theory of Exchanges,' list enunciated by Prévost, and since greatly extended and carefully verified by Stewart, which is to this effect: 'Every body is continually radiating heat is all listentians the quantized height property. in all directions, the amount radiated being greater as the temperature is higher.' Thus the radiation from a body depends on itself alone, the amount absorbed depends on the radiation which reaches it. Hence the apparent radiation of cold in the experiments above mentioned is due to the fact of the pile or thermometer radiating off more heat than it receives, as its temperature is higher than that of the freezing mixture to which it is opposed. From this it is evident that any number of bodies left near each other tend gradually to assume a com-mon temperature. By this theory of exchanges we explain the cold felt in sitting opposite an open window in a frosty day, even when there is no draught.

Convection. - A hot body cools faster in a current of air than in a still

atmosphere of the same temperature, evidently because fresh supplies of the colder air are continually brought into contact with it. This carrying off of its heat by a stream of air is an example of convection. It is by convection mainly that heat is conveyed throughout liquids and gases. Thus, when a lamp is applied to the bottom of a vessel of water the heat does not diffuse itself in the water as it would (by conduction) in a mass of metal, but the expansion of the heated water at the bottom rendering it lighter, balk for balk, than the superinenmbent fluid,



causes it to rise to the surface; and thus, by convection, the heat is diffused through the mass. Conduction, properly se called, can scarcely be shown, though it really exist, in liquids or gases, on this account. The tremulous appearance of any chieft as seen by light which pages many a bat. object as seen by light which passes near a hot surface, as that of a boiler or a red-hot poker, is due to the convection of heat in the air, the warm current refracting light less than does the cold air. See VENTILATION.

For the mechanical applications of heat, sec AREENGINE, STEAM-ENGINE, &c., and for their theory, see THERMO-DYNAMICS.

Sources of Heat.—They may be, so far as we know, ultimately reduced to two—chemical combination and mechanical energy; and, indeed, in all probability the former is only a variety of the all probability the former is only a variety of the immensely different forms in which the latter is manifested. A more full examination of this point, and a general statement of the ultimate nature of the various sources of heat, will be found in the article Energy above referred to. See also COMBUSTION, FUEL; and for heating apparatus, see WARMING.

Heath (Erica), a genus of small shrnbs of the of four leaves, a bell-shaped or ovate—often ventricose—corolla, and a 4-celled, 4-8-valved cap-ule. The leaves are small, linear, and evercapsule. The leaves are small, linear, and ever-green. The genus consists of about 400 species,



besides innuncrable hybrids and varieties raised in gardens. The home of the genus is in the western part of South Africa, but a few species are distributed over western and northern Europe. E. trimted over western and northern Europe. E. vulyaris—now generally named by botanists Culluna vulgaris (fig. 1)—is the most widely distributed of all heaths, extending as it does over
central and northern Europe to the Arctic Circle.
It is the ling, heath, or heather of British moors
and mountains. The genus is not found in Asia, America—except in Labrador, Cape Breton, Nova Scotia, and parts of New England, where the common heath occurs—nor in Australia. Six species, including the ling, are found in the British Isles.

Cross-leaved Heather (E. tetralix) (fig. 2) and Fine-leaved Heather (E. cinerca) (fig. 3) are common plants in most parts of Britain, and, like most of the genus, are very beautiful when in flower. The heather-bells of Scottish song are the flowers of one or both of these species. A sprig of E. cinerea was the badge of the Macdonalds at the cineral was the badge of the Maddonalds at the time when they existed as a distinct clan. E. carnea, common in the southern parts of Europe, is a very frequent ornament of British flower-borders. Many species, remarkable for the size and beauty of their flowers, are much cultivated in greenhouses. Some of the south African or Cape heaths attain in their native region a much greater size than any European heath except E.

arborea, which in the Pyrenees sometimes grows to the height of 20 feet. The so-called Briar-100t (q.v.) of which tobacco-pipes are made is a heath.

In the Highlands of Scotland the common heath served in former times a great variety of purposes. The poorer folks formed walls for their cottages with alternate layers of heath and a kind of mortar made of earth and straw, and they made comfortable if not huxurious beds of it, placing the roots downwards, and laying the plants in a sloping direction. With heath cottages are also thatched, besoms are made, and faggots are formed to bmn in ovens. In the island of Islay ale was made by brewing one part of malt with two of the young tops of the common heath, and this liquor, accord ing to Boece, was used by the Picts. Sheep and goats sometimes browse on the tender shoots, but they do not like them. The young tops form almost exclusively the food of grouse. From the flowers bees extract a great quantity of honey, which is of a very deep colour.

Heathfield, George Augustus Eliott, Lond, the heroic defender of Gibraltar, was the seventh son of Sir Gilbert Eliott, and was born at his father's seat of Stobs in Royburghshine, on Christ-mas-day 1717. Having been educated at the university of Leyden, and at the French military college of La Fère and at Woolwich, he had his first experience of actual warfare in the war of first experience of actual warrare in the war of the Austrian succession, in which he was wounded at Dettingen and fought at Fontency. Having been gazetted colonel of a regiment of light horse in 1759, he served at its head with the English con-tingent that assisted Frederick the Great against Austria in the years 1759 to 1761. In the follow-ing year he went out to Cuba as second in com-mand under the Earl of Albemarle, and retarned lower with the rank of light tenart general. When home with the rank of lientenant general. When, after the outbreak of the war with the American colonies, Great Britain became involved in hostilities with Spain as well, Eliott was sent out to put Gibraltar in a state of defence. His obstinate and heroic defence of this stronghold, from June 1779 to February 1783, against all the power of Spain, ranks as one of the most memorable achievements of Briti-h arms (see Gibraltar). On his return home he was in 1787 raised to the peerage as Lord Heathfield, Baron of Gibraltar—Heathfield being a Sussex estate which he had purchased in 1763. He died at Aix-la-Chapelle, 6th July 1700. Drinkwater's History of the Siege of Gibraltar is one of the best accounts of military heroism ever written. after the outbreak of the war with the American

Heaven, in its theological sense, is that portion of the infinite space in which the Lord of all things, though present throughout all, is supposed to give more immediate manifestations of his glory. It is also the place, or the state or condition, of the blesced spirits, and of the souls of just men made perfect who are admitted into the participation or the contemplation of the divine beatitude. It is the special seat of the glory of the Most High, in which his angels minister to him, and the blessed spirits abide in perpetual praise and adoration. In the Scriptures the word is used in various senses: (1) for the region of the atmosphere; (2) sometimes for the region of the stars—the hosts of heaven; (3) as a state of blessedness attainable even here, (3) as a state of blessedness attainable even here, as in Eph. ii. 6, where it is said 'God hath raised us up together (with Christ), and made us sit together in heavenly places;' and also in Phil. iii. 20, where the conversation of the saints while yet on earth is said to be 'in heaven;' (4) as the place where God dwells, where the angels and the spirits of the saints are congregated, whence Christ cause and whither he her returned (Jahr). Christ came and whither he has returned (John, xiv. 2, &c.). Many of the saints of Christendom in moments of ecstatic elevation of spirit have

believed that glimpses into heaven have been vonchsafed to them, but their accounts of these visions have usually been but incongruous and contradictory. The figurative language in which its museen glories are described in Scripture has made such an excitation of fancy the more easy for devont souls rapt in profound meditation about what it has not been given to the eye of man to see

nor the heart to conceive.

Aristotle declares that all men have a conception of gods, and that all agree in placing their habitation in the most elevated region of the universe. The Egyptian, the Scandinavian, the Assyrian, and all primitive religious maintain the existence of a heaven as the place of reward after death for vintances lived on earth; and indeed it may be taken as the universal corollary to the universally held belief in the immortality of the soul, even though it may be only under the form of the final stage in a cycle of purificatory transmigrations. But among primitive peoples it is little more than a dim and shadowy continuation of this present world, the pale ghosts that inhabit it wearing the form and fashion that they were in life. The idea of future retribution enters early into the moral conscionsness of man, but it would hardly be true to say that it is everywhere present. The Tentonic warrior had his war-horse and his armonr laid in his barrow that he might continue into the spirit-world the joys of life, his Valhadla being hat a glorified extension of the warrior's life, just as the Red Indian's paradise is but a richer and more extensive hunting-ground. Yot the unseen life is often but poor and cheerless compared with the warm and actual world—even in the Elysian fields the shade of Achilles would gladly change places with the meanest soldier in the Grecian hast.

The Korm adopts the Cabbalistic notion of seven heavens, which rise above each other like the stages of a building; and it places the chief happiness of heaven in the unrestricted and inexhaustible joys of sense. The Cabbalistic writers divide these seven heavens according to the successive degrees of glory which they imply. The seventh is the abade of God and of the highest order of angels; the sixth, lifth, fourth, and third are the successive abodes of the various grades of angels, arranged according to the degrees of dignity. The second is the region of the clouds, and the first the space

between the clouds and the earth.

For the development of Jewish and Christian Eschatology, and the significance of the conception of heaven, see the article HRLL, under which the subject of future rewards and punishments is discussed with some fullness.

Hebbel, Friedrich, lyrical and dramatic poet, was born at Wesselburen, in Ditmarsh, 18th March 1813. After travelling in Germany, France, and Italy, ho settled at Vienna in 1840, where he married the actress Christine Enghans. He died at Vienna, 13th December 1863. His principal works are his Gedichte (2 vols. 1841 48), and several dramas, the best among them being Judith (1840), Maria Magdalena (1844), Agnes Bernauer (1855), Gyges and sein Ring (1863), and his masterpiece, Die Nibelungen (1862). Hebbel had strong dramatic talent, skill in drawing character, and command of vigorous language, but no feeling for boanty. His dramas are destitute of love and joyousness; they depict the revolt of passionate natures, the frenzied riot of evil desires, and are characterised by an almost demonic vigour of action. His collected works appeared in 12 vols. (Hamburg) in 1866-68. See Biographics by Kul (1877) and Frankl (1884), and Hebbel's Tagebücher (2 vols. 1887).

Me'be, the goddess of youth, the daughter of Zeus and Hera, was the wife of Hercules after he had been deified. She was the emphearer in Olympus, before Zeus conferred that office upon Ganymede; lant she always retained the power of restoring the aged to the bloom of youth and beauty. According to Apollodorus, she became the mother of two sons by Herenles—Alexiares and Aniketos. In Homer she always appears as a virgin. In Athens alturs were creeted to her conjointly with Herenles. In Rome she was worshipped under the name of Juventus, and a temple in her honour existed on the Capitoline Hill at the time of Servius Tullius. Statues of Hebe are extremely rare; she is to be recognised only by the nectureup. All the world knows the masterpiece of Canova.

Heber, Reginald, an English poet, and second Bishop of Calcutta, was born at Malpus, Cheshire, 21st April 1783. It was as a student of Brasenose College, Oxford, that he produced his prize poem Palestine (1803), the only prize poem perhaps which holds a place in English literature. In 1807 he was inducted into the family-living at Hodnet, in Shropshire. He was a frequent contributor to the Quarterly Review, his political views being those of a Tory and High Churchman, and in 1812 he published a volume of Hymns. He was appointed Bampton lectmer in 1815, a prebendary of St Asaph in 1817, and in 1822 was elected preacher of Lincoln's Inn. In the following January he accepted the see of Calcutta. The apostalic zeal with which he conducted his episcopacy was suddenly terminated by his death, of apoplexy, at Trichinopoly, on 3d April 1826. He was a voluminons writer, and published scranons, A Journey through India, &c., and he edited Jeremy Taylor's Works (1822). As a poet, his fame rests upon Palestine and his Hymns (new ed. 1878), which include such well-known favourites as 'Lord of Mercy and of Might,' 'From Greenhund's Ley Mountains,' 'Lo, He comes in Glonds descending,' 'Jesus Christ is risen To-day,' &c. See the Life by his widow (1830).—Righlard Hebber, half-brother of the preceding, was born in Westminster in 1774, and died in 1833. He was a famous bibliomaniae. Dibdin estimated his collection in England at 105,000 vols., in addition to which he possessed many thousands of books on the Continent, the whole having cost him £180,000.

Hébert, Jacques René, commonly known as Père Duchesne, one of the most despieable characters of the French Revolution, was born at Alençon, in 1755. At an early age he went to Paris as a servant, but was dismissed from more than one situation for embezzling money. Soon after the commencement of the Revolution be became one of the most prominent members of the extreme Jacobins; and when this group established Le Père Duchesne newspaper, for the purpose of arashing the constitutional paper edited by Lemnire and bearing the same title, 11èbert was made editor of it. And he conducted his paper with such reckless ribaldry as to make himself a darling of the mob. In consequence of the events of the 10th August he became a member of the revalutionary conneil, and played a conspicuous part in the massacres of September. He was one of the commission appointed to examine Marie Antoinette, and his name will survive in unending infamy for one font and baseless charge he brought against her. He and his associates, called Hébertists or Enrugés, were mainly instrumental in converting the church of Notro Dame into a temple of Reason. But he went too fast for Robespierre, who got rid of him through the guillotine, 24th March 1794. His whining cowardice on the scaffold carned him the jeers and insults of the fielde mob.

Hebrew Language. The word Hebrew ('ibr') is an adjective, formed, according to the Old Testament, from Heber ('iber), a descendant of Shem (Gen. x. 22-24), who was the aneestor of Shem (Gen. x. 22-24), who was the aneestor of Abraham (Gen. xi. 12-26). The Septinagint, however, already reinders Gen. xiv. 13, 'Abraham the crosser' (i.e. of 'the river,' though Origen explains the name from 'crossing' Mesopotamia towards Canaan), and Aquila translates 'the dweller on the other is a 'meladia of the Emberta. the other side, probably of the Euphrates, though it might be the Jordan. The word 'Hebrew' is used both of individuals and the people when antithesis to other nationalities is expressed (Jon. i. 9; Phil. iii. 5; Gen. xxxix. 14; xl. 15; Exod. i. 16; ii. 6, &c.), 'Israel' being more a domestic name, often having religious significance. As a national

often having religious significance. As a national name, Israel belonged specially to the northern kingdom, of which it is used freely in the Moabite Inscription (e.g. lines 5, 11, 14).

The phrase 'Hebrew language' does not occur in the Old Testament. In the carliest reference to the speech (Isa. xix. 18) it is called the 'language of Canaan,' and in another passage, referring to events of the same period, 'Judean' or Jewish (2 Kiugs, xviii. 26, 28; Isa. xxxvi. 11, 13; cf. Neh. xiii. 24). This passage is interesting as showing the linguistic attainments of the Assyrian officials and others of this age. The Rabshakeh could sneak Hebrew, and Hezekiah's officers understood and others of this age. The Rabshakeh could speak Hebrew, and Hezekiah's officers understood Aramaic, which appears to have been the language Aramaic, which appears to have neen the language of diplomacy and commerce at this time, a position to which it would naturally attain, from the fact that the Araman peoples lay along the great trade rontes between east and west. The name 'Hebrew' is first used of the language of the Old Testament in the prologne to Ecclesiasticus of the language of the language of the Old Testament in the prologne to Ecclesiasticus of the language of the language of the Old Testament in the prologne to Ecclesiasticus 130 B.C.), and then in the New Testament (Rev. ix. 11). After the dissolution of the Jewish state Aramaic more and more made encroachment state Aramaic more and more made encroachment in Palestine, Dan. ii. 4-vii. 28, Ezra, iv. 8-vi. 18, and Jer. x. 11 being written in that dialect, to which also belong the words Jegar-Sahadutha, 'heap of witness' (Gen. xxxi. 47). Gradually it superseded Hebrew as the spoken language, and, though mixed with elements of Hebrew, was the dialect in was in the time of sure local control of the sure of the dialect in use in the time of our Lord, as it had been for a long time previously. All the words reported as spoken by him (such as talitha koumi or koum, long shebaktani) are Aramaic. The name Hebrew was thus given to two languages, the ancient Hebrew, and the more modern Aramaic in actual use, though chiefly to the latter (John v. 2): 'their proper tongue,' to which Akeldama belongs (Acts, i. 19), is Aramaic. Which of the two languages is meant, Acts, xxi. 40, xxii. 2, xxvi. 14, may be doubtful.

The Hebrew language is one of the family of speeches since Eichhorn's time usually called Shemitic or Semitic, the peoples speaking them being in the main descendants of Shem. The family has four great divisions: (1) the Northern or Aranuaic (Syriac or Eastern, and so-called Chaldee or Western Aramaic and Samaritan); (2) Middle or Hebrew (including Phænician and Moabite); (3) Sonthern or Arabic (embracing Sabeau or Sonth Arabic, and Ethiopic); (4) To these must now be added an Eastern or Assyro-Babylonian division (see SEMITIC LANGUAGES). Hebrew shares with its sister-languages these and other peenliarities: roots with three consonants; vowels having no significance as stem-letters; two verbal forms for the expression of tense; two genders; the attachment of the oblique cases of personal pronouns to nouns and verbs in the form of suffixes; an inability, except in proper names, to form compounds, whether verbal or nominal; and a syntax distinguished by simple co-ordination of clauses by means of and, where other

languages subordinate with a unltiplicity of coninnetions. At a remote period we must suppose mimitive Semitic spoken by a united, homogeneous people, which afterwards separated in various directions, each section retaining and developing some of the originally common elements of the tongne, until gradually, under many influences of climate and conditions of life, the treat diplace accepted by the treat diplace. the great dialects acquired distinctness from one another. In this way some minitive elements another. In this way some primitive elements would be retained by one family and others by another, while each would move along new lines of development, due to its idiosyncracies and circumstances, as Helirew, for example, expresses 'west' by 'sea.' Even in the earliest form in which we observe Hebrew it shows marks of linguistic decad-It has almost entirely renounced nominal case-endings; given up the use of the dual, except in a few nouns; is in process of substituting the neffexive for the passive (a process completed in Aramaic and Ethiopic); and has lost the consciousness of the strict sense of its elementary moods. In short, literary Hebrew is already nearly at the same level as vulgar Arabic, as distinguished from inflected Arabic, or as modern English is compared with Anglo-Saxon. On the other hand it has some peenliar excellences, as the greater freedom in regard to the place of words in the sentence, and the singular tense usage known as vav conversive, of which, however, it is now known to have no monopoly, but to share it with the language of Moab.

lieyond differences of pronunciation and usages peculiar to separate localities, 'dialects' can hardly have existed in Hebrew. In the north a shorter form of the relative appears, she or sha (Ass. sha)—c.g. Judges, v. 7. This is common in the Canticles (of disputed date), and in later books, as Cantales (of disputed date), and in later books, as Ecclesiastes, and usual in post-biblical Helnew. The Ephraimites appear to have shared the usual Shemitic tendency to confuse sh and s (Judges, xii. 6); and in the south Amos (vi. 8; viii. 8) shows another common failing, that of confusing the gutturals, a thing said to have gone to an extreme in Galilee in the age of Christ, and abundantly exemplified in Assyrian. So far as the literature of the language is concerned only two periods can of the language is concerned, only two periods can be distinguished: (1) from the earliest times to the restoration from exile (538), and (2) from the restoration to our era (see Bible). It is true that writers on the borders of the cxile, such as Jeremiah and Ezekiel, show a tendency to employ Aramaic words and forms; but, on the other hand, writings of the exile period, as Isa. xl.-lxvi. and much else, are splendid examples of Hebrew composition. The restored community in Judah would of course still speak and write Hebrew. In the north of the country, however, the policy of Assyria had long ago settled a number of colonists, speaking mainly Aramaic. When Palestine came under the infineuce of the Syro-Greek kingdom the Aramaic was program would become greater. pressure would become greater. And thus gradually Hebrew receded before the Aramaie, until by the time of the Maccabees, or considerably earlier, the latter had become the spoken language. Among the learned, however, the ancient tougue was still cultivated and written, though naturally not in its ancient purity, nor without many new developments. These new elements are of several kinds: first, nominal and verbal forms, partly absolutely novel, but mostly a great extension of forms occurring rarely in the classical language; and secondly, a considerably altered vocabulary, drawn partly perhaps from a lower stratum of popular speech than that touched by the biblical writers, but greatly from the Aramaic Examples of this new literary, though degenerate, Hebrew may be seen in its earliest form in Ecclesiastes,

and in a much more advanced condition in the

Mislina (c. 200 A.D.).

The character in which Hebrew was written was the ancient Semitic alphabet, common over unch of the East, the origin of which is traced by some to Egyptian hieroglyphs, and by others to different sources (see ALPHABET). The oldest to different sources (see Alphabet). The oldest and most beautiful example of this character is the Moabite Inscription (c. 900 B.C.; see Moan); a somewhat ruder form appears in the inscription from the Siloam tunnel, probably of the age of Ahaz or Hezekiah (740-700 B.c.; found in 1880; see Proc. Soc. Bib. Archarol. 1882). The latter was excented at their own hand by the workmen who cut the tunnel, and is naturally less artistic, though extremely interesting, as showing how extended the art of writing was at so early a time (Isa. x. 19). In the Moabite monument the same letter appears in several forms, which suggests either great practice on the part of the sculptor, or else that he faithfully copied a model supplied him by the pen, in this case a facile one. The character appears in a bigger, more robust form in the Phoniappears in a neger, more robust form in the Fuent-cian inscriptions—e.g. of Eshmunzar. Somewhat modified it is Samaritan; in south Arabia it is Himyaritic or Sabeun; and from there it passed to Abyssinia, and is Ethiopic. The Syriac and Arabic are the same letter in cursive forms. The Aramean influence on southern Palestine introduced not only its dialect but also its script. The present Labour toward and a conveyted corner. Hebrow square character is in a somewhat ornamental shape—a cursive form of the aucient alphabet adopted by the Arameans; the article Alphabet shows both the Phenician and the later square Hebrew character. The monuments show this Aramean cursive in various forms of development. Jewish tradition ascribes its introduction to Exra, a tradition which expresses merely the facts that a change took place in the to the return from exile. The use of the letter no doubt crept in gradually, just as the use of the Aramaic dialect did. The ancient letter is still seen on coins of the later Maccabean princes. Some deviations of the Sopting int from our present Hebrew text seem explainable from the supposition that their MSS, were written in the ancient character; while, on the other hand, some discrepancies rather suggest MSS. in the square letter. The words of Christ, 'one jot or tittle,' have been thought to show that the square character, in which y (' or yod') is much the smallest letter of the alphabet, had long been in use.

The history of the language would not be com-

The history of the language would not be complete without one or two additional facts. (1) In Semitic languages the consonants alone are usually written. Of course, no language could be spoken, and no writing read without vowel-sounds, but no signs for these sounds existed. ('crtain weak consonants, however—viz. h, u, y, were early used to indicate the place of lang vowels, particularly at the end of words, and also of diphthougal sounds (ai = c, au = 0) in the middle of words. Already in the Moabite stone final vowels are so marked, and occasionally diphthougs within words. Phoenician, on the contrary, uses such signs very little. Ancient Hebrew agreed with Moabite in its practice, as appears from the Siloum inscription. The use of these se-called vowel-letters was probably scanty and fluctuating in early times, but became more regular afterwards. Unfortunately, we have no guarantee that transcribers were careful to preserve the autique spelling. Our present text is too uniform to be supposed to have preserved the varieties of different ages, and it is evident that the MSS, of the Soptnagint translators in a multitude of cases were without the medial vowels, and in some cases without the final vowels, new present

in the Hebrew text. In the end of the 1st or early in the 2d century a standard text was adopted, and modernising of the spelling in the main ceased. Peculiarities were henceforth registered, not effaced. This period during which the consenantal text was troated extends to the cra of the Tahmud (c. 500 A.D.). During its course a multitude of works were produced—e.g. Midrashim, or homiletical expositions, especially of the books of the Pentateneh; the Mishua (200 A.D.), a code of traditional law; and the tracts composing the Tahmud, which are commentaries on the Mishuic law, but containing much haggadie or edifying matter. (2) Neither Jerome (d. 420) nor the Tahmud knows anything but the consonautal text. The example of Syrian scholars and necessity led, however, to the invention of a very complete system of external signs for the vowel-sounds of the language. This is the Massoretic system of points, now printed in our Bibles. Its anthors are unknown, and also the age at which it was completed. Minute as it is, it can make little pretension to represent the pronunciation of the language during a period of nearly a thousand years in disuse must have undergone changes; the Septuagint prononness in many cases differently from the present text; and, in point of fact, the vocalisation represents not the pronunciation of a spoken language, but that of the seleum intoned reading in the service of the synagogne.

About the 10th century a new impulse was given to the study of Hebrew by the example of the Arabic grammarians. The interest of the latter was to begin with a purely religious one—i.e. to explain the Koran. Even the earliest collections of poetry had this religious object. The poetry of the desert was accepted as the purest Arabic, and it was collected and studied with the view of illustrating the syntax of the Koran. By-and-by grammar came to be cultivated for its own sake, and the ancient poetry studied for the sake of its intrinsic charms. In emulation of their Arabic confrères, a school of Hebrew grammarians arose, to which belong such names as Sa'dia of the Fayyma, Chayynj (1000), Abn'l-Walid Merwan ibn Janach, Abenezra (d. 1167), Dav. Kinchi (d. 1235). Where Arabic was not used a neo-Hebraic language was employed by these scholars, greatly a return to biblical Hebrew, and in this many commentaries were composed, as by Abenezra, Kinchi, and Rashi of Troyes (d. 1105). At the revival of letters Christian scholars became apt pupils of the Jews—c.g. John Renchlin (d. 1522). In the next century the chief seat of Hebrew learning was Switzerland, where flourished Buxtorf the Elder (d. 1629); and in the century following Holland, the most famous representative of the Dutch school being Alb. Schultens. In the 19th contary the most distinguished promoters of Hebrew learning have been Gesenins of Halle and Ewald of Gottingen.

The following is Gen. i. 1–3 in Hebrew:

: The following is (ten. i. 1–3 in Helnew) בְּרֵאשִׁית בְּּרָא אֱלֹהִים אֵת הַשְּׁסֵיִם וְאֵת הָאָרֶין: וְהָאָרֶין הָיְתָה תֹהוּ וָבֹהוּ וְחִשֶּׁךְּ עַל־פְּנֵי תְהוֹם וְהוּת אֱלֹהִים מְרַחֶפֶּת עַל־פְּנֵי הַפְּוִים: וַיּאׁמֶר אֱלֹהִים וְהִי־אוֹר ויהי-אוֹר:

See Gesenius, Gesch. der Heb. Sprache (1815); Renan, Hist. Gen. des Langues Sémitiques (4th ed. 1863).

Modern Hebrew.—A few observatious may be added, in conclusion, on the use of Hebrew as a spaken and writtou language among modern Jews. Hebrew has continued down to the present day as the language of the synagogue. Except in the Reform communities of Germany and America, public and even private worship is

almost entirely conducted in 'the sacred tongue.' Although the majority of western Jews, particularly among the upper and middle classes, possess but an imperfect acquaintance with it, the authorities manifest a strong disinclination to cease praying in a language which, it is nrged, constitutes a powerful link between Israel's present and past, and serves as a bond of union between Jews all the would over. Outside the synagogne, Hebrew can scarcely be said to have survived as a spoken language, except that in Jernsalem and other eastern cities it forms a sort of Lingua Franca among the Jews of various nationalities settled there. written and printed language, however, the employment of Hebrew is far more general. It serves as a nniversal medium of correspondence, both private and official, among Jews in various parts of the world, and particularly between the East and the West. Various weekly journals are also written in it, in Europe as well as in Palestine. Added to this, numerous Hebrew works on all subjects con-tinue to be composed by learned Jews. The Hebrew thus used for modern purposes is usually not the pure Hebrew of the Bible and synagogue, but the rabbinical dialect in which Jewish doctors of the law have studied and commented, written and distributed in the base of the law have studied and commented written and distributed in the base of th puted since the age of the Mishna, and which has been developed and amplified by Jewish philosophers, poets, and grammatians throughout the middle ages. Both kinds of Hebrew—biblieal and nabbinical—must be carefully distinguished from the patois dialects affected by Jews in countries the patois dialects affected by Jews in countries where they have not yet been fully enancipated or modernised. In Russia and the adjacent parts of Germany and Anstria they speak a jargon composed of Hebrew and compt German, ealled Jidisch-Deutsch, while in parts of the East a Judeo-Spanish dialect flourishes by its side. The promunciation of Hebrew differs among the two geographical sections into which Jews are divided, and which are known as Ashkenazim or 'Germans,' and Sephardim or 'Portuguese,' the former being of German and Polish origin, and the latter having migrated from Polish origin, and the latter having migrated from the south of Enrope or being still distributed there. The origin of this difference is not exactly known, but it may be assumed that the 'Portuguese' mode of reading originally came from Palestine, where the vocalisation and pronunciation of Hebrew were fixed by the Massorites of Tiberias, and that the German Hebrew originated in the academies of Babylan under the influence of the Eastern-Syrian grammarians. The Sephardic system is hence supposed to be purer than the Ashkenazic.

Hebrews, Epistle to the epistle in the eurliest MSS, is simply 'To Hebrews.' This title is probably not from the hand of the writer, but due to some copyist who embodied the writing among others. The term 'Hebrews' is a national title given to all those descended from Abraham, in opposition to Gentiles or Greeks (2 Cor. xi. 22; Phil. iii. 5; cf. Heb. ii. 16); or in a narrower sense it is applied to Jews still speaking a Semitic language, in opposition to Hellemists or Greek speaking Jews (Acts, vi. 1). It is probably used in the more general sense here, and the title merely suggests, what is evident, that the epistle was addressed to persons of Jewish descent. The opinion that the letter was addressed to Hebrews in general, wherever they might be, cannot well be maintained, owing to the many local and personal references, and the details of history given by the author. He hoped to see the Hebrews soon, as he had been with them before (xiii. 19, 23). In their earlier history they had suffered persecution and the spoiling of their goods (x. 32), some of them had been or were in bonds (xiii. 3, x. 34), although their afflictions had not yet gone so far as martyrdom (xii. 4), unless it may be that some of

those having the rule over them had so suffered (xiii. 7). Their circumstances and the lapse of time, and probably also the disappointment of their hopes of the coming again of Christ (x. 37), had not been without a wearing effect upon them; their Christian enthusiasm had grown cold (x. 25), and they had not advanced, or rather had fallen back, in their Christian knowledge and experience (v. 11-14); and though distingnished by liberality to their poorer brethren, as they had always been (vi. 10), they were wavering in their faith, and in danger of falling away from it (ii. 1-3, iii. 12, vi. 4, x. 25-29); they had need of patient endurance (x. 36, xii. 1 ct seq.) and fear lest any of them should seem to come short of the rest of God (iv. 1, xii. 15). Terrible warnings are uttered by the author in regard to the sin of apostasy and the impossibility of recovering to the faith those who fall away after being enlightened (vi. 4-8, x. 20-31, xii. 15-17), although that for which they were in danger of renonneing their Christian faith is nowhere distinctly stated. From the general drift of the epistle, however, it may be inferred that what the anthor feared was a relapse into Juduism, and hence he exhorts them to break conclusively with the old dispensation and go forth without the eaun (xiii. 9-14).

The question of the locality where persons having such a history and living in such eigenments be sought has been very differently answered. The traditional view has been, under the assumption of the Pauline anthorship of the epistle, that the church in Jernsalem was addressed. And perhaps this is still the prevailing opinion. There are, how-ever, serious obstacles in the way of this opinion. The church in Jernsalem must have still contained many who had seen and heard the Lord, while those here addressed had only heen evangelised by those who heard him (ii. 3). Such facts as these; that the epistle is in Greek, and by a writer who knows the Scriptines only in Greek, and who, though hardly a native of Palestine, stands in such relations to the Hebrews as he does; that they are interested in Timothy, the devoted minister of St Paul (xiii. 23); that the church, so far from being poor, is able to minister to the necessities of the saints (vi. 10); and that the author seems to count upon the sympathy of his readers with his advanced views—these facts are rather against Jerusalem. On the other hand, the idea that the Hebrews must have been exposed to the seductions of an imposing ritual, which could only be the Temple service, has little support in the epistle. The author's refer-ences to the Old Testament ritual are purely ences to the Old Testiment Intait are purely theoretical, and have no bearing on the existing practices; he reasons entirely on the written scrip-ture, on Judaism as founded by Moses, and his arguments would be understood by Jews everywhere, as the system of thought and the feelings against which he directs them were common to them in all places. Others have thought of Alexandria. The author is certainly a man of Alexandrian culture, and the line of thought he pursues would be very natural if addressed to Alexandrian It is almost a fatal objection to this view, however, that, though the epistle was early known and highly valued in the church of Alexandria, not a trace of a tradition appears that they were the recipients of it. Clement believed that the epistle was written in Hebrew, and addressed to Jerusalem by St Paul. In modern times some have advocated the claims of Rome. The first references to the epistle are found in the letter of the Roman Clement to the Corinthians (c. 96 A.D.). The consistent tradition in Rome, too, is that the epistle is not by St Paul; and the reference to Timothy, and to those of Italy (xiii. 24) would, on this view, find a natural explanation, and also, perhaps, some remarkable coincidences between the epistle and that

The Church of Rome, however, to the Romans.

must have always been greatly Gentile, and references like xiii. 7, 17 preclude the idea that a Jewish section of a church was addressed.

The anthorship of the epistle is involved in equal obscurity. In the earliest times opinion was divided. In Rome and the West the consistent tradition is that the epistle is not Panline. Africa Tertullian refers to it as by Barnabas (De Pudic., e. 20). In Alexandria and the East, on the other hand, it is regarded as Pauline, either immediately, or mediately through a translator (Clement), or some one who had given the Pauline thoughts form and expression (Origen). Augustine gave in to the Alexandrian view, and since his time the Pauline authorship was accepted in the West. At the Reformation Luther suggested Apollos as the author; and Calvin either Luke or Clement of Rome. Modern scholarship is virtually unanimous in the opinion that the epistle is not from the hand of St Paul. This view is based on many things, as upon the language, which is purer Greek than any other New Testament writing; upon the rhetorical, rhythmical, and flowing style, and the carefully planned and systematic form of the treatise, which has none of the abruptness and sudden transitions characteristic of the ness and sudden transitions characteristic of the Panline writings; upon the fact that the author appears to be ignorant of Hebrew, quoting always the Septuagint, and basing his reasoning on its renderings, even when it deviates from the Hebrew; upon the different formulas employed in citing Scriptune; and particularly upon the author's system of thought, which reflects Alexandrian Jewish philosophy in some places, and which, though reaching the same conclusion with St Paul that Christianity has fulfilled and emerged that that Christianity has fulfilled and superseded the old economy, reaches it by a different road. The place of St Panl's circle of legal ideas—guilt, satisfaction, imputation, justification by faith—is taken by a circle of ideas having reference to worship of God: sin is uncleanness hindering the sinner from drawing night to God; the blood of Christ purifies the conscience so as to serve the living God (ix. 14); hence redecuption is conceived as the work of a perfect High-priest. Paith is generalised into a realising of the unseen (chap, xi.); and the Spirit does not appear to occupy the place he has in the Pauline writings as the source of the new Christian life. Modern scholarship has not succeeded in suggesting any new name as author of the epistle, opinions being divided in favour of Apollos, Barnabas, Clement, Luke, and Silas.

It has been thought that if Jerusalem had fallen

before the author wrote he would certainly have nsed this fact to support his teaching that Judaism had been transfigured into Christianity, and con-sequently that the epistle dates before 70 A.D., probably about the beginning of the Jewish war It must be acknowledged that owing te the anthor's theoretical method of reasoning on Judaism, which would apply to it whether the temple and ritual remained or not, this argument is not very strong, and others prefer a later date. The epistle is largely used in Clement's Epistle,

which is usually assigned to about 96 A.D.

The persons to whom the epistle is addressed being such as above described, its theme is, the finality of Christianity as a religion. This finality is shown by a continuous contrast with Judaism. The contrast has three main steps, which move, so te speak, backwards or inwards, accompanied always by earnest exhortation. (1) Chap. i.-ii., Christ, the Son, exalted because of death to be head of the new world of redemption. Contrast with angels. (2) Chap, iii.-iv. 13, Christ, the Son, the faithful leader into the rest of God. Contrast with Moses and Joshna. (3) Chap. iv. 14—x. 18, Jesus, the Son of

God, the heavenly High-priest, and true sacrifice. Contrast with Aaren, with the earthly tabernacle, and with the sacrifiees of bulls and goats. On this follows a splendid passage of exhortation (chap. x. 19—xii, 29) on the application and personal appre-priation of the truths just tanght. And finally (chap. xiii.), a more personal conclusion.

See the commentaries by Bleek (3 vols. 1828-40), the same, Commentary (1 vol. 1868); Tholnek (3d ed. 1850); Delitzsch (1857, trans Clark); M. Stuart (new ed. 1876); Biesonthal (1878); Angus (1888); Lowrie (N.Y. 1884); A. B. Davidson, Clark, Handbooks); Keil (1885); Lunemann (in Meyer, Eng. trans.); Weiss (in Meyer, 1888); Rendall (1888); Edwards (1888, Expositor's Bible); Westeott (1880); Lange (Eng. trans.); also Richm, Lehrbepriff des Hebraterbriefs (1859). Full literature in Lange's Commentary (Clark). Commentary (Clark).

Hebrews, Gospel of the. See Apocrypha.

Hebrides, or Western Islands, the name applied in a general sense to all the islands on the west coast of Scotland. To the Onter Hebrides, the geological substratum of which is almost exclusively gueiss, belong Lewis with Harris (Long Island), North Uist, Benbecula, Sonth Uist, Barra, and the remote group of St Kilda, 60 miles to the west. The principal of the Inner Islands, composed chiefly of trap and slate, are Skyr, Eigg, Coll, Tiree, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Colonsay, Oronsay, Jua, and Islay. Bute, the Cumbraes, and Arran, are usually counted amongst the Hebrides; and to the same arount were anciently assigned the neutronsals. Hebrides, the geological substratum of which of Kintyre, the island of Rathlin, and the Isle of Man. The total number of islands of any size Man. The total number of islands of any size is about 500, but of these only one-fifth are inhabited. The population was 100,021 in 1881. Of the whole surface only about 200,000 acres are arable; the rest is pasture-land of little value, morasses, peat-mosses, lakes, and barren sands and rocks. Owing to the influence of the Gulf Stream, the Hobrides have a mild though lumid climate. Politically the Hebridean isles are distributed among the Scattish countries of Pear are distributed among the Scottish counties of Ross, Inverness, Argyll, and Buto. The lumbler class of natives for the most part speak Gaelie. The peeple are much occupied in fishing and fowling (see Crofter). A large proportion of the area has been converted into sheep-walks, whilst extensive tracts are let to sportsmen.

The Hebrides are the Ebude of Ptolemy and Pliny's Hebudes (of which 'Hebrides' is a comption, due originally to a misprint), and Sudreyjar (Southern Islands) of the Norwegians. This last name was Latinised as Sodorenses, which survives in the title 'Bishop of Sodor and Man.' early Celtic inhabitants were converted to Christianity ly St Columbia in the 6th century. Some three centuries later several of the islands were colonised by Norwegians, who came hither to escape the iron rule of Harold Haarfager (q.v.). But in consequence of the severe depredations which these sea-rovers afterwards connitted on the coast of Norway, Harold sent an expedition westwards, which subdued all the Western Islands as far seuth as Man. To Norway they remained subject till 1266, when they were transferred to Scothard. From that time the islands were governed by native chiefs, until in 1346 the head of the Macdonalds reduced the whole under his anthority, and took the title of Lord of the Isles (q.v.). But from the beginning of the 16th century they were gradually annexed to the Scottish crown. In the 19th century the Hebrides have become widely known through Scott's poem The Lord of the Isles and Mr William Black's charming novels.

The more important works on the Hebrides are Martin's Description (1703); Tennant's Tour (1774); Dr

Johnson's Journey (1775); Gregory's History (1836); Macculloch's Description (1819); Buchanan's Hebrid Isles (1883); and Gordon-Cumming's In the Hebrides (1883).

Hebrides, New. See New Hebrides.

Hebron, one of the oldest cities in Palestine, belonging to the tribe of Judah, 21 miles SSW. of Jcrusalem. It was anciently called Kirjatharha, and at a later period was the seven years' residence of King David hefore he conquered Jerusalem. The modern town, El Khalil ('the friend'—of God, Abraham), is a poor place, inhabited by some 10,000 people. It lies low down in a narrow and picturesque valley—the Valley of E-locol, famous now, as of old, for its thick clustering grapes, its olives, and other finits. The church erected by the Empress Helena, the mother of Constantine, on the spot where Abraham is said to have been huried, has been converted into a mosque called El-Haram ('sanctuary'), built to enclose the cave which is the traditional hurial-place of Abraham, Isaac, and Jacoh and their wives. See an article by ('onder in the Palestine Exploration Quarterly,' October 1882.

Hecatæus of Miletus, an early Greek historian and geographer, usually styled 'the logographer,' flourished most probably about 500 B.C. He seems to have visited Greece, Thrace, the countries bordering on the Euxine, and many of the provinces of the Persian empire, with parts of Italy, Spain, and Africa, and the results of his abservations were given in two great works—his Tour of the World, and his Histories or Genealogies; the latter, however, is little more than a prose version of the poetical legends of the Greeks. Only fragments now remain, which have been edited by Greuzer, Klansen, and Müller. At the revolt of the Ionians against Persia he dissnaded its ringleader, Aristagoras, from an attempt so far above the means of his countrymen; and when that counsel was despised, urged the formation of a fleet, but in vain. Hecatæus afterwards went as annhassador to the Persian satrap Artaphernes, and induced him to treat the Ionians with leniency.

Hec'ate, a mysterious goddess who was apparently unknown to the Greeks of Homeric times and may be of oriental origin. She makes her first appearance in Hesiod as a goddess having power over earth, heaven, and sea. This triple power over earth, heaven, and sea. This triple power may perhaps give the clue to the fact that in art she is occasionally represented as a triple figure. It also explains the fact that ultimately, and especially in Orphic literature, she came to be identified with many other goddesses, such as Artenis, Elicithyia, Selene, Iris, Persephone, Aphrodite, Gaia, Hestia, Isis, Physis, and the Bona Dea. Owing to the extont of her domain she was especially able to grapt the wishes of her vertaries and to ally able to grant the wishes of her votaries and to give them the fulfilment of their desire in battle, in athletic and other contests, in the popular assembly, and in the law-courts. But her power was above all displayed in the matter of ghosts and bageys; she was able not only to ward off the visits of such hags but also to send them. Indeed, besides sending an Empusa or an Antæa, she also berself appeared as a bogey, with torch and sword, and snakes for hair; or she might appear as a dog, and snakes for nan; or sine angles appearance a mare, a lioness, or a cow. As her appearance was the sign for dogs to bark, so she was supposed to be accompanied by a train of Stygian dogs. The to be accompanied by a train of Stygian dogs. The origin of this figure is uncertain; she is claimed as a moon goddess, and her name is interpreted in accordance with this view as indicating the action of light at a distance. It makes against this theory, however, that the lunar functions of Hecate are not mentioned by any author earlier than Sophoeles, and that they do not become prominent in her

worship until post-classical times, and then only 'in the systems of the later mythologists' (see Class Rev. June 1888). Her intimate connection with the spirits of the dead would rather point to her having originally been a goddess of the nether world, for the earth is regarded as the abode of the spirits of the departed. This would explain her connection with the mysteries, and the projitiatory offerings made to her in atonement for sin. Finally, the unsatisfactory explanation of her name just given may be safely set aside, as too abstract, in favour of the interpretation of the name as meaning 'dog' (Hecate: Gen. hund: Eng. hound:: Gr. hekaton: Hund-red. See Class. Rev. Nov. 1889). This harmonises with various points in the ritual of Hecate; dogs were offered to her at cross-ways (which are favourite haunts for ghosts), she her-elf is termed fond of dogs, and sometimes appeared leading Cerberus.

Hecatomb, in the worship of the Greeks, and in other ancient religions, a sacrifice of a large number of victims, properly, although by no means necessarily, one hundred. As early as the time of Homer it was usual only to burn the legs wrapped up in the fat and certain parts of the intestines, the rest of the victim being eaten at the festive meal after the sacrifice. In Athens the hecatomb was a most popular form of sacrifice; while the thrifty Spartans on the contrary limited the number both of the victims and of the sacrifices. In the hecatomb, strictly so called, the sacrifice was supposed to consist of one lumdred bulls; but other animals were frequently substituted.

Hecker, Friedrich Karl Franz, a leader of the democratic party in the Gennan revolution of 1848, was born at Eichtersheim, Baden, September 28, 1811. After studying law in Heidelberg, he became in 1838 advocate of the supreme court in Mannheim. But in 1842 he abandoned his profession for political life, joining the democratic and socialistic party, of which he speedily became one of the recognised heads. On the outbreak of the revolution in 1848 he endeavoured to convert the preliminary convention (*Dus Yopparlament*) into a permanent republican assembly. But, frustrated in this attempt, he put himself at the head of a band of revolutionists, and invaled Baden from the south; he was, however, defeated at Kandern (20th April), and fled to Switzerland. In the following year he settled in America as a farmer near Belleville, in Illinois. On the outbreak of the eivil war he raised a regiment of Germans, and afterwards for a time commanded a brigade. He died at St Louis, 24th March 1881.

Hecker, Justus Friedrich Karl, medical author, was born 5th January 1795, and became professor of Medicine at Berlin. He died 11th May 1850. Among his writings are a history of medicine (1829), books on the Black Death, &c., and the great work, the Epidemics of the Middle Ages (trans. for Sydenham Society, 1846).

Heckles (Mid. Eng. hekele, from the Dutch hekel, huak, 'a hook;' cf. Ger. haken; another English form is huckle) are very important parts of varions machines employed in the preparation of animal and vegetable fibres for spinning. They consist of a series of long metallic teeth, through which the material is drawn, so that the fibres may be combed out straight and so fitted for the subsequent operations. (Alls are heckles with finer teeth (see Spinning.—Heckling is also now the received term (first used in Scotland) for the rough and trying process of catechisation to which parliamentary candidates and members are subjected by their constituencies.

Hcckmondwike, a market-town in the West Riding of Yorkshire, 8 miles NE. of Huddersfield. It is the chief seat of the carpet and blanket manufactures in the West Riding, and also makes rngs, pilot-cloth, and flushings. There are ironworks, machine shops, and coal-mines in the neighbourhaod. Here was horn John Chrwen, the inventer of the Tonic Sulfa system. Pop. (1851) 4540; (1881) 9282.

Heck, or Hekla, a volcanic mountain in Iceland, stands isolated about 20 miles from the south-west coast and 68 miles E, from Reykjavik. Its snow-clad summit is 5102 feet high, and has live craters. The sides of the mountain are seemed by numerous deep ravines. The principal rocks are lava and taff. Frantastic groups of bills, craters, and lava, leading the eye to distant snow-covered jökuls; the mist rising from a waterfall; lakes embosomed amid bare bleak mountains; an awful and profound slumber; lowering clouds; marks all around of the funious action of the most destructive of the elements, give to the region a character of desolution searely to be paralleled.' A record of the cruptions has been kept since the 9th century, during which time there have been eighteen outbreaks. These have generally been very violent, and have often continued for a considerable time. In September 1845 a terrific outbreak occurred and lasted for more than a year. A fine dust from this emption was scattered over the Orknoy Islands, a distance of 500 miles from Heela. Indeed, the great quantities of fine dust ejected, and the immense distances to which it has been carried, have generally been noted as characteristic of the Teelandic emptions.

Hectare. See ARE

Heetic Fever (Gr. hektikos, 'Inditual;' see Figure) is the name given to the fever which occurs in connection with certain wasting diseases of long duration. It is one of the most serious and constant symptoms of Consumption (q.v.), and seems to be directly related to the progressive emaciation which marks the course of that malady. In the marning the patient's temperature may be normal. He may even feel chilly. But towards evening or after eating he grows hot and fushed; and there is a preternatural vividness of expression, which, with the heightened colour, sometimes gives a very fallacious impression of health. The patient retires to bed, has tossing and measy sleep, and wakens in the middle of the night, or towards early morning, bathed in cold perspiration, and in a state of extreme languor. The same exhausting cycle repeats itself day after day. The only radical way of treating the fever is to cure the disease on which it depends. When the symptom itself must be combated, a pill containing a grain of sulphato of quinine, with half a grain of digitalis and as much of. Dover's powder, taken three times a day, is often servicealile.

Hector, the eldest son of King Priam and Heenba, husband of Andromache, and father of Astyanax (Scamandrius), appears in Homer's Illust as the ideal of a warlike hero, brave to the last degree, yot faithful and tender alike as husband, father, and sen. One of the noblest passages in the Iliust describes his parting with Andromache. He helds the same rank among the Trains as He holds the same rank among the Trojans as Achilles among the Greeks, and, after bearing the main burden of the war, falls at length by the hand of Achilles curaged at the death of his beloved companion Patroclus. His body was dragged in triumph by the conqueror round the tomb of Patroclus, but was afterwards ransomed by Priam, who caused it to be burned with great pomp.

Hec'uba (Gr. Hekithe), the second wife of Priam, king of Troy. During the Trojan war she witnessed the destruction of all her sons, with the exception of Helenus, and at last saw her husband murdered

hefore her eyes by the savage Pyrrhus. After the destruction of Troy she fell into the hands of the Greeks as a slave, and, according to one form of the legend, threw herself in despair into the sea. Enripides (in his tragedy of *Hecabe*) and other ancient tragedians describe her as a tender mother, a noble princess, and a virtuous wife, exposed by fate to the most cruel sufferings.

Heddles. See WEAVING.

Hedge (A.S. hege, another form of haga, whence modern haw; ef. Ger. hag. The Fr. haie is of Tentanic origin), a living or growing fence, in contradistinction to wall, paling, &c., used for the purposes of enclosure, shelter, and ornament in connection with agriculture, forestry, ment in connection with agriculture, forestry, and gardening. Hedges are very nuch used in some parts of the world, whilst others, equally enlitvated, are almost destitute of them. Thus, whilst they are very common in many parts of Britain, they are comparatively rare in France and Germany, as well as in America. They are formed of many kinds of trees and shruhs according to the purpose in view, the nature of the exposure, the elevation of the site, and the soil in which they are to be planted. It is essential, whatever plant may be used, that it should hear without injury the degree of annual pruning necessary to keep it trim and within the proper limits of a fence.

For the purposes of agriculture and forestry

For the purposes of agriculture and forestry Hawthorn (q.v.) is almost universally employed in Britain wherever the conditions of soil and situation are favourable to its growth. When properly attended to, especially in respect of annual pruning, it is the most effectual fence for domestic animals, and also an excellent shelter. On elevated sites, those exceeding 1000 feet above sea level, it does not succeed well. In such positions elder, mountain ash, &c. are planted for shelter in the form of hedges, but are deficient in the other qualities of a fence. Beech hedges are familiar in some districts. fence. Beech hedges are familiar in some districts. Substitutes for hawthorn in praviding shelter by the senside are found in sea-buckthorn, snowberry, searlet dogwood, sloe, wild-pear, &c., but none of them are of value in repelling cattle. Ornamental hedges are formed of holly, yew—the latter is regarded as poisonous when eaten by cattle, horses especially, and should therefore be selected only for positions which they cannot approach—arbor vitar, laurel, privet, harberry, both evergreen and deciduous; beech, hornbeam, &c. In some parts of the west of Scotland and Wales, and in the south of England and many parts of the coast of Ireland, permanent hedges of fuchsia, const of Ireland, permanent hedges of fuclsia, arbitis, and other beautiful evergreen or flowering shrubs are to be found, though they will not endure the cold of inland and cost coast districts in the same latitudes.

In the United States the English hawthorn is nseless as a hedge-plant, as the foliage is late, is destroyed by the heat, and is much infested by insects; the native thorns are little better. In various parts of the states where hedges are employed serviceable plants are bodock (see Bois

D'ARO), honey locust, pyricanth, the Macartney rose, linekthorn, barberry, &c.

Hedges were in use among the ancient Remans, chiefly for the enclosure of vineyards and gardens. It is probable that they have existed in England since the times of the Romans, although net very common till the end of the 17th century; but they are supposed to have been first introduced into Scotland and Ireland by the efficers of Cronwell's annies,

Hedgebote, an eld word for the right of a tenant to ent wood on the farm or land for repairing the hedges or fences.

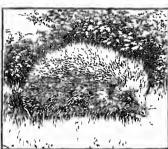
Hedgehog, the European representative of the genus Erinaceus, the type of the family Erinaceides, order Insectivous (q.v.). The chief characteristics of the genus are: body capable of being rolled up into a ball by the action of a powerful muscle arising from the head and neck on either side, and forming a loop around the posterior extremity; ears distinct; teeth, three incisors on each side in eats distinct; teeth, three increases on each side in either jaw, the central pair long and prominent, molars, seven on each side above, five below, with rounded tubereles; zygomatic arch of the skull complete; legs short, with five toes on each foot; the two leg bones ankylosed; tail short; back covered with spines, the remainder of the body with being and trights. with hairs and bristles.

There are fourteen species, none of which occur in the New World or

Australia. The Common

Hedgehog

(Erinaceus



europeus) has a sharply pointed unzzle and ears less than half t h clength of the head. The eyes are small and black. The animal Common Hedgehog animal (Erinaceus europæus). at most about a foot long, and some six inches high. The spines which

cover its back attain a maximum length of about an inch; they are sharply pointed and remarkably firm and elastic, so much so that they constitute a cushion upon which the animal will allow himself to fall from a considerable height with impunity. They are finely grooved along the sides, and have a pin head-like root so attached to the musele of the back that when the latter contracts they radiate outwards in all directions.

The animal cats small vertebrates, such as mice, young birds, and frogs, insects, worms, and sometimes vegetable matters. It is very useful in a garden or in a house infected by cockroaches. It has even been known to attack and devour snakes, seeming to have some special power of resisting not only the poison of the viper, but also other noxions substances. It is nocturnal in its habits, and hibernates throughout the winter, and, according to the Gypsies, with whom it is a special delicacy, it does store up birds, mice, crab-apples, &c. It inhabits hollows of trees or crevices in the rocks, but in default of these will excavate itself a burrow. The pairing season is from the end of March to the beginning of June; and the period of gestation is seven weeks. Three to six (rarely eight) young are born at once; they have both the eyes and ears closed. The spines are at first quite white and soft, and since they point backwards and the young are born head lirst there is no risk of injury to the

mother during parturition.
Its area of distribution extends over the whole of temperate Europe and the greater part of Asia north of the Himalayas. Fossil hedgehogs have been found in the Tertiary formations.

Hedgehog Plant, a name given to those species of medick (Medicago) which have the pods spirally twisted and rolled up into a ball beset with spines. They are particularly plentiful on sandy grounds near the sea in England, and in some parts of South America; and their pods are too plentiful in the South American wool imported into Britain. They afford excellent food for sheep and cattle.

Hedge-mustard (Sisymbrium), a genus of plants of the natural order Crucifere, annual or rarely perennial herbs, with very various foliage, small yellow or white flowers, and a long roundish or six-angled pod (silique). Several species are natives of Britain, of which one, the Common Hedge-umstard (S. officinale), was once employed in medicine for extarrhs and other ailments. It is said to be diaphoretic and expectorant. It has a mild pungency. It is sometimes cultivated as a pot-herb. It is an annual plant, plentiful in waste places and by waysides, sometimes two feet high, branched, with runcinate or deeply-lobed leaves, stem and leaves hairy, flowers very small and yellow. The pods are erect, and closely pressed to the stalk.

Hedge-sparrow, also called Hedge-warbler, Hedge-accentor, or Dunnock. See Sparrow, Warbler. HEDGE-

Hedjaz. See ARABIA. Hedjrah. See HEGIRA.

Heem, JAN DAVIDSZ VAN, the greatest painter of 'still life' that the Dutch school has produced, was born at Utrecht in 1600 or 1604, studied under his father, likewise a still-life painter. In 1635 Jan enrolled himself in the Antwerp guild of painters; and in that city he died in 1683 or 1684 Heem's and in that city ac area in 1933 or 1934. Heem's pictures represent for the most part fruits and flowers, insects and creeping things, and drinking enps, bottles, &c. Masterpieces by his hand are hing in the galleries of Amsterdam, Vienna, Berlin, Munich, St Petersburg, and other places. His drawing and colouring are exquisite, and his use of chiaroscaro memprassable.

Heeren, Arnold Hermann Ludwig, German Heeren, Arnold Hermann Ludwig, German historian, was born 25th October 1760, at Arbergen, near Bremen. He first made himself known by an edition of Menander's Dr. Encomiis (1785), and in 1787 was appointed professor of Philosophy, and in 1801 professor of History, at Göttingen. He married in 1797 a daughter of Heyne, and died 7th March 1842. The striking feature about his teaching and writing was that he studied the peoples of classic antiquity from the modern standpoint, as the title of his mineiral work shows—Idean diller the title of his principal work shows—Ideen über Politik, den Verkehr und den Handel der vornehmsten Volker der alten Welt (1793-96; 4th ed. 1824-26; Eng. trans. 1833). Besides this he wrote Geschichte des Studiums der classischen Literatur seit dem Wiederaufteben der Wissenschaften (2 vols. 1797-1802), Geschichte der Staaten des Alterthums (1799; 5th ed. 1828; Eng. trans. 1840), and Geschichte des europaischen Staatensystems und seiner Colonien (1800; 5th ed. 1830; Eng. trans, 1834), which abounded in new views and cente expositions. His Untersuchungen aber die Kreuzzuge won a prize offered by the National Institute of France. His Kleine historische Schriften (3 vols. 1803-8) contain some very interesting treatises and a biography of Heyne. In 1821-26 he published an edition of all his historical works in 15 vols.

Hefele, Karl Joseph von, an eminent Catholic church historian, was born at Unterkochen in Würtemberg, 15th March 1809. He studied at Tilbingen, and became in 1836 privat-docent, and in 1840 professor of Church History and Christian Archæology, in the Catholic theological faculty of that university. He showed himself a dangerous enemy to the dogma of papal infallibility even ous enemy to the dogma of papal infallibility even after his consecration as Bishop of Rottenburg in 1859, by his weighty contributions to the Honorius controversy: Honorius und das sechste allgemeine Konzil (Tüb. 1870), and Causa Honorii papae (Naples, 1870). But after his return from Rome, in a pastoral epistle in 1871 he gave in his adhesion to the dogma, with the explanation that the infallibility of the pope, as well as that of the

church, referred only to doctrine given forth ex cathedra, and therein to the definitions proper only, but not to its proofs or applications. Of Hefele's but not to its proofs or applications. Of Hefele's writings may be panied an edition of the Apestolie Fathers (1839; 4th ed. 1855); Chrysostomus-Postille, a translation (1845; 3d ed. 1857); Die Einführung des Christentuns im südwestlichen Deutschland (1837); Der Kardinal Ximenes und die kirchlichen Zustunde Spanians im 15ten Jahrhandert (1844: 2d ed. 1851; Eng. trans. by Caron Dalton, 1860); Beiträge zur Kirchengeschichte, Archäologie und Butrage zin Kurhengeschichte, Archaologie und Liturgik (1864-65); and especially his magistral Konzdiengeschichte (Freiburg, 7 vols. 1855-74; 2d ed. 1873 et seq.)—of which an English translation by W. R. Clark, coming down to the Conneil of Niewa (325), was published in 1871.

Hegel, GEORG WILHELM FRIEDRICH, was the last in a succession of four great writers, who during the later part of the 18th and the first quarter of the 19th century developed the idealistic philosophy of Germany; the other three being quarter of the 19th century decempes.

philosophy of Germany; the other three being Kant, Fichte, and Schelling. He was horn at Stuttgart on the 27th August 1770, and educated at the university of Tubingen, where he formed an intimate friendship with Schelling, his philosophical predecessor. Schelling was five years younger than Herel, but very precedious. His rapid than Hegel, but very precocious. His rapid intuitive genius urged him to express his thoughts almost before they were ripe for expression, and he had begun to publish important contributions to philosophy oven before his student-life had come to an end. Hegel, on the other hand, was slow in his intellectual development, and from a desire for systematic completeness and consistency he was unwilling to atter his thoughts till he had made all their relations clear to himself. Consequently he distinction, and it was not till six years after he left it—years during which be unintained himself by acting as a private tutor—that he began to seek academic work and to bring his views upon philo-

sophical questions before the public. In 1801, however, he entered upon his scholastic career at the university of Jena, publishing at the same time an essay on the difference between the philosophies of Fichte and Schelling, in which he on the whole placed himself on the in which he on the whole placed himself on the side of the latter, though not without indicating some divergences of view. From 1801 to 1806 he continued to teach in the university of Jena, first us a privat-docent (or licensed lecturer), and then as a professor extra-ordinary, and in the early part of that period he joined with Schelling in writing a philosophical periodical called the Critical Journat of Philosophy. At this time the two philosophers were so closely identified in their views that there has been considerable dispute as views that there has been considerable dispute as to the authorship of some of the articles. In one of Hegel's latest contributions, however, the reasons for his subsequent separation from Schelling are clearly indicated. It was not till 1807 that Hegel imblished the *Phenomenology of the Spirit*, the first work in which he fully exhibited the depth and independence of his philosophic reasons. By this time, weight in governments of genius. By this time, mainly in consequence of Napoleon's victory over the Prussians, the university of Jena was for a time broken up, and Hegel was forced to find employment as the editor Hegel was forced to find employment as the editor of a newspaper at Bamberg. In the following year he was appointed director of the gymnasium or public school of Nuremberg, where he remained during the next nine years. In 1811 he married, and in the following year he published the first volume of his greatest work, the *Logic*, a treatise which tweats of what is ordinarily called *Logic* in connection with Metaphysic. It was not till 1816 that his growing fame as a writer scentred his nomination to a professorship in Heidelberg: this nomination to a professorship in Heidelberg; this,

two years after, he exchanged for the chair of Philosophy at Berlin formerly occupied by Fichte. There he continued to teach till the 14th November 1831, when he was carried off by a sudden attack of cholera. During these years he published several works, of which the most important is the Philo. sophy of Right, and centributed several articles to the Philosophical Year-book, a journal which was mainly, though not exclusively, the organ of his disciples. His influence during this period was so great that he might also be said to have been the philosophical dictator of Germany. At his death a number of his friends combined to prepare a complete edition of his works, in which they included not only the books he had published during his lifetime, but also reports of courses of lectures delivered by him upon many departments of philosophy. Among these may be mentioned specially his lectures upon the *Philosophy of Religion*, the *Philosophy of Art*, the *History of Philosophy*, and the *Philosophy of Ilistory*.

It is impossible within our limits to characterise adequately the work of such an encyclopedic mind as Hegel's, but it is possible in a few words to indicate the main tendencies of his philosophy. In the first place, Hegel was an Idealist. By this it is meant, however, not that he reduced the facts of the outward world to ideas, or held that there are no facts but the ideas of the individual mind. It is meant only that he held that we must ultimately explain the world as the manifestation of a rational principle. Kant had shown that all known or knowable objects are relative to a conscient subject, and that therefore we cannot legitimately treat them as things in themselves i.e. as things that might exist by themselves even if there were no intelligent principle in existence to know thom. He had shown, in other words, that existence means nothing unless it means existence for a self. Hegel carried the argument a step further, and muintained that the world of objects is not only related to an intelligence, but that it can be nothing but the revelation or manifestation of intelligence. In this way he sought not only with Kant to show the impossibility of a materialistic explanation of things, but to prove the necessity of an idealistic explanation of them. He did not therefore deny the reality of the material world, but maintained it to be an imperfect or incomplete reality which could not exist by itself without something else to supplement it. He attempted to prove that matter is the necessary object and counterpart of spirit, in which spirit reveals, and through which it realises, itself; and that indeed the material world only shows its ultimate meaning, when we regard it as the natural environment and basis for the life of spiritual beings.

In the second place, Hegel connected this idealistic or spiritualistic view of things with the great modern idea of Evolution or Development. That idea is often supposed to involve that the highest and most complex existences may be traced back to the lowest and simplest—that, for example, we may hope ultimately to explain the phenomena of life by mechanics and chemistry, and the phenomena of thought and will by the powers of nutrition and sensation which are manifested in the lowest forms of animal life. And in a similar way the idea of evolution is supposed to imply that we can explain the highest forms of religion as nething more than refined reproductions of the crude superstitions of savages. Hegel, on the other hand, maintains that, as it is the developed form that first tells us what was in the germ, as it is only the life of the man that shows what was latent in the child, so under the idea of evolution we must take the man as explaining the animal, and the

organic as exhibiting what is latent and obscure in the inorganic. Not, indeed, as if the special sciences of mechanics, chemistry, biology, &c. were not right in keeping to their own special principles. But, in the last resort, when we attempt, as it is the business of philosophy to attempt, to see all these spheres of existence in their relation to each other, as well as to the intelligence that knows them, we must regard nature as becoming self-conscious—i.e. as revealing its secret meaning only to and in man; and we must find the key to the secret of man's nature in the highest energies of

his moral and intellectual life.

Finally, in attempting to work out this idea of evolution Hegel teaches us to regard it as a progress by antagonism. While, therefore, there is a unity of principle in all things that exist, yet, in order to develop, this principle must differentiate itself, must manifest itself in different forms, and these forms must inevitably come into conflict with each other. In truth, however, the forms which have thus come to be opposed are really complementary or necessary to each other, and therefore their conflict is limited by the unity which they express, and which ultimately must subordinate them all to itself. This idea may be most easily illustrated by reference to the unity of the social organism, which manifests itself in a division of labour between its members. In developing their powers these members are brought into antagonism with each other; but if their conflict and competition is not to destroy the society, it must be subordinated to their co-operation. That the organic unity of the society should must be in the subordinated to their co-operation. That the organic unity of the society should maintain itself means, therefore, that society should maintain itself means, therefore, that there should be such community between its members that all their conflict and competition should only lead to a better distribution of functions between them, and should thus contribute to direct and improve the life of the society as a whole. This illustration may give some eluc to the principle which Hegel works out in application to all spheres of the life of nature and of man. On it is based Hegel's ultimate division of philosophy into the three departments—logic, or the science of thought in its pure unity with itself; the philosophy of nature, in which the ideal principle, which is supposed to exist in all things, is shown to under-lie even the externality of the material world; and the philosophy of spirit-i.e. of the life of man as a self-conscious being, standing in relation to a material world, which scems to be altogether external to him, and yet subordinating it to his own life. But these words are the indication of ideas which it would take many pages fully to explain.

explain.

Hegel's collected works, edited by a number of friends and disciples, appeared after his death in 18 vols. (1832-45). On his life and philosophy, see Rosenkranz, Hegels Leben (1844), Apologie Hegels (1858), and Hegel as Doutscher Nationalphilosoph (1870); Hayin, Hegel und seine Zeit (1857); Küstlin, Hegel (1870); the histories of this period of German philosophy by Michelet (1838), Chalybaus (5th ed. 1860), and especially Erdmann (vol. iii. 1848-53); Hutchison Stirling, Secret of Hegel (2 vols. 1865); Wallace, translation of the Logic from the Encyclopidite, with prolegomena (1874); E. Caird, Hegel (in 'Philos. Classics' series, 1883); Seth, The Development from Kant to Hegel (1882); Hegel's Esthetic, by Kedney, Hegel's Logic, hy W. T. Harris, Hegel's Philosophy of Heistory and the State, by G. S. Morris, in the 'German Philosophical Classics' series (Chicago, 1886-90). There is a translation of Hegel's Philosophy of History, and a translation of the first part of Hegel's Esthetic, with an introduction by B. Bosanquet (1859); see also the American Speculative Journal of Philosophy (Chicago), passim.

At the time of Hegel's death his philosophy was dominant in Germany; and at that time there seemed to be a consensus among his pupils as to its interpretation.

But division soon arose between those who, following the apparent tendency of their master, interpreted the principles of Hegelian philosophy in an orthodox and conservative spint, and those who emphasised its negative dialectic, and used it as a weapon of attack against the existing order of church and state. After the appearance of Strauss's Leben Jenu (1835) the school may be regarded as having broken up into 'Old Hegelians,' or 'the Eight'—Hotho, Gabler, Erdmann, Daub, Marheineke, Goschel; 'the Centre'—Rosenkranz, Gans, Vatke, Conradi; and 'the Left,' the 'Young Hegelians'—Strauss, Michelet, Feuerbach, Bruno Bauer, Ruge, Karl Marx—of whom sourc even maintained that the legitimate development of the philosophy was found in atheism, materialism, and communism. The result of these controversies was that the Hegelians almost ceased But division soon arose between those who, following these controversies was that the Hegelians almost ceased to exist as a definite school; but the ideas of Hegel still retain their power, and form one of the most important retain their power, and form one of the most important elements in modern culture. Many who cannot be regarded as in any strict sense Hegelians have owed their main philosophic stimulus to Hegel—such as F. C. Banr, Schwegler, Zeller, Kune Fischer; and the so-called 'pseudo-Hegelians'—I. H. Fichte, Weisse, Chalyhaus, Ulrici, Carrière. Hegelianism is the most important element in the philosophy of the popular pessimist Von Hartmann. Out of Germany, Hegelianism is represented more or less directly by Heiberg and Martensen. presented more or less directly by Heiberg and Martenen in Denmark; in France, by Leroux, Prévost, and others; in Italy, by Vera and Mariano; in Britain, by Hutohison Stirling, J. Caind, E. Caird, Wallace, Green, and Bradley; in America, by W. T. Harris and others,—Hegel's eldest son, Karl (born 1813), became distinguished as an historian, and was professor of History successively at Rostock and Enlangen.—Another son, Inmanuel (born 1814), held high administrative offices under the Prussian government, and was leader of the Conservative and government, and was leader of the Conservative and High Church party.

Hegesippus, the earliest of the Christian church historiaus; of his life we know nothing save that he was almost certainly a Jewish convert and that he flourished about the middle of the 2d and that he flourished about the middle of the 2d century. From a statement of his own, preserved in Eusebins (iv. 22), we learn that he made a journey to Rome, visiting Corinth upon the way, and when at Rome compiled a list of the hishops of the Roman see down to Anicetus (156-67 A.D.). Further, he is represented as adding 'to Anicetus succeeds Soter; and to Soter, Elentherus' (175-20). 89). Hegesippus must thus have written most of his history previous to 167 A.D., and he most probably published it early in the episcopate of Eleutherns. This agrees well with the statement of St Jerome that Hegesipins had bordered on the Jerome that Hegesipins had norvered on the apostolic age (vicinus apostolicorum temporum), for if horn so early as 120 he came very near the age of St John. His work was entitled Five Memorials of Ecclesiastical Affairs, and appears not to have been a complete and continuous history, although extending from the death of Christ to the writer's own age. Unhappily it survives only in a few fragments which Eusebius had embodied in his own history, the most important of bodied in his own history, the most important of which are his account of the martyrdom of St James and also of St Simeon of Jerusalem. Eusebins commends his doctrinal fidelity, and St Jerome the simplicity and unpretentionsness of his style. The question has been much discussed whether The question has been much discussed whether Hegesippus belonged to the Judaising Christian party or not. Baur went so far as to pronounce him a declared enemy to St Paul, relying mainly upon a passage preserved in Photius, in which Hegesippus declares that an opinion of many, corresponding exactly to what is said in 1 Cor. ii. 9, is contradictory to the express word of the Lord himself in Matt. xiii. 16. But it is much more likely that Hogestippus is heare spining at the Corestia likely that Hegesippus is here aiming at the Gnostic misconception of these words rather than that of St Paul, for the reference is obviously to their claims to special spiritual insight; while a further passage preserved, used by the Tübingen school to fortify their inference—viz. that those who were

622

The fragments of Hegesippus will be found in vol. i. of Routh's Reliquice Sacree (1847), and in vol. ii. of Grabe's Spicilegium,

Hegira, Hejra, or Hijra (an Arab word which means 'going away'), the term commonly used to indicate Mohammed's flight from Mecca, 18th September 622 A.D. In 639 or 640 the Calif Omar instituted a new Moslem calendar, to begin with the first day of the first month of the year in which the flight took place. The Mohammedan year, as a hmar year, is shorter than ours by 10 days, 21 hours, and 1½ seconds. A rough and ready method for finding the year in our calendar corresponding to a given year in the Mohammedan is to sponting to a given year in the Monahinedan is to subtract from the latter $\frac{1}{34}$ of itself and add 622 to the remainder. To find the precise year and day, multiply the year of the Hegia by 970224, strike off from the product six decimal figures, and add 621 5774; this will give the year of the Christian era; and the day of the year is got by multiplying the decimal figures by 365.

Heiberg, the name of two Danish anthors.

See DENMARK, Vol. 111. p. 759.

Heide, the chief town of northern Ditmarsh, in the Prassian province of Sleswick-Holstein, 58 miles by rail WSW, of Kiel. Chief industries are shoomaking, paper-making, and brewing, is the birthplace of Klaus Groth. Pop. 7855.

Meidelberg, an ancient city of Germany, in the grand-duchy of Baden, extends for about 3 miles along the left bank of the river Neckar, in one of the most beautiful districts in the country, 13 miles by rail SE, of Manuheim and 54 S. of Frankfort-on-the-Main. It lies 380 feet above scalevel, at the base of the Konigsstuhl (1863 feet). Among its most important buildings are the church of the Holy Chost, a splendid example of Late Gothic architecture, in which service according to the Catholic and Protestant rituals is simultaneously carried on; the church of St Peter's, on the door of which Jerome of Prague nailed his celebrated theses; and the magnificent ruins of the castle, which stand on a hill 330 feet above the town. Begun at the close of the 13th century, and added to in 1410, 1559, and 1607, it was formerly the residence of the Electors Palatine, and was in great part destroyed by the French in 1689 and 1693, and further injured by lightning in 1764. In the cellar under the castle is the famous Heidelberg Tun, once capable of containing 50,000 gallons of winc. Heidelberg is celebrated for its university, which was founded by the Elector Rupert I. in 1386, and continued to flourish until the period of the Thirty Years' War, when it began to decline. In 1802, however, when the town with the surrounding territory was assigned to the Grand-duke of Baden, a new era commenced for the university, and it rapidly became famous. It comprises faculties of theology, law, medicine, and philosophy, has about 110 professors and lecturers, and is attended by about 800 students. Its library consists of some 500,000 volumes and 4700 MSS. consists of some 500,000 volumes and 4700 MSS. Many of the most famous German scholars have been professors here—Reuchlin, Geelampadins, Spanheim, Puffendorf, Voss, Schlösser, Grenzer, Gervinus, Panlus, Kuno Fischer, Helmholtz, Bunsen, Blüntschli, &c. The quincentenary of the university was celebrated with elaborate ceremonial in 1886. Heidelberg, originally an appanage of the bishopric of Worms, became in the end of the 12th century the seat of the Counts Palatine, and continued to be so for nearly six Palatine, and continued to be so for nearly six centuries. After the Reformation Heidelberg was

long the headquarters of German Calvinism, and gave its name to a famous Calvinistic Catechism (q.v.). The trade is chiefly in books, tobacco, beer, and wine. The town suffered much during the Thirty Years' War, was savagely treated by the French in 1689, and was in 1693 almost totally destroyed by them. Pop. (1871) 19,988; (1885) 24,417, of whom two-lifths are Catholics and about 800 Jews. See works by Oncken (3d ed. 1885), Drnm (1884), and Thorbecke (1886); also The Century Magazine, August 1886.

Heights may be determined by four methods; by Trigonometry (q.v.), by Levelling (q.v.), by ascertaining and comparing the atmospheric pressure at top and bottom of the height by the Barometer (q.v.), or by ascertaining and comparing the boiling point of water at the top and bottom by the Thermometer (q.v.). See also SURVEYING.

Heijn, or Heyn, Piet, a famons Dutch admiral, was born in 1570 at Delftshaven, near Rotterdam. After an adventurous career, he became vice-admiral under the Dutch East India Company. In 1624 he sailed to Sonth America and defeated the Spaniards near San Salvador (Brazil), and again in 1626 in All Saints' Bay (Bahia), when he took above twenty of their ships, returning to Holland with an immense booty Two years later he captured the Spanish silver flotilla, the value of which was estimated at 16,000,000 Dutch guilders. As a reward for this success he was in 1629 named Admiral of Holland. On 20th Angust of the same year he met his death in a sea-light against the privateers of Dunkirk off that town. A marble menument is creeted to his memory in the old church at Delft.

Heilbronn, a town of Würtemberg, situated on the right bank of the Neekar, in a beautiful and fertile region, 28 miles by rail N. of Stuttgart. The streets of the old medieval town are narrow, and the houses have quaintly ornamented gable-onds and tapering pinnacles. The church of St ends and tapering pinnacles. The church of St Kilian, partly Gothic and partly Renaissance; the old town-hall; the Diebsthurm ('Thief's Tower'), in which (lötz von Berlichingen was confined; and the house of the Teutonic Knights, now a barrack, are the principal buildings. The chief industries include the mammfacture of silver-plate, paper, sugar, salt, chicory, and chemicals, and there are irou and other metal foundries and machine-shops. Fruit and wine are largely grown. Commercially the importance of Heilbronn depends upon its trade in groceries, corn, and wood, and upon its fairs for eatile, leather, wool, and fruit. In the vicinity gypsnu and sandstone are quarried. Heilbrom is first mentioned in 741; in 1360 it became an imperial town; it suffered during the Peasants' War and the Thirty Years' War, and in 1802 it fell into the hands of Wurtemberg. Pep. (1875) 21,208; (1885) 28,038.

Heiligenstadt, a Catholic town of Prussian Saxony, situated on the Leine, 32 miles ENE of Cassel by rail, has manufactures of cotton, cigars, paper, and pins. Pop. 5861.

Heilsberg, a tewn of Prussia, 40 miles S. of Känigsberg. It was originally the chief town of Ermeland, one of the old divisions of Poland, and received town rights in 1308. Here the allied Russians and Prussians under Bennigsen defeated the French under Soult and Murat on 10th June 1807. Pop. 5705.

Heilsbronn, a Bavarian village of middle Franconia, 16 miles SW. of Nuremberg by rail, was the seat of a celebrated Cistercian monastery, which owed its origin to Bishop Otho of Bamberg in 1132. Nearly all the burgraves of Nuremberg were buried here till the end of the 15th century,

when it became the burial-place of the Franconian branch of the Holenzollerns. Although the monastery was suppressed in 1555, the church still retains a large number of highly-interesting sepulchral monuments and other examples of medieval German art. See works by Stillfried (1877) and Muck (3 vols. 1879-80).

Heimskringla. See Snorri Sturlason.

Heine, HEINRICH, the most prominent figure in German literature since Goethe and Schiller, was born of Jewish parents on 13th December 1799, in Dusseldorf on Rbine. His boyish heroes were Napoleon and Napoleon's stalwart groundiers and drummers. At a Roman Catholic school in Dusseldorf he learned what it was to be jeered at and ill-treated on account of his race and creed. At sixteen he was sent to Frankfort to learn banking, but he soon gave it up; rontine work was wholly repugnant to him. Next he tried trading on his own account in Hamburg, but soon failed. About the same time he fell in love with a daughter of his rich uncle, Solomon Heine of Hamburg; and his grief at her non-requital of his passion, jealously nunsed as it was, formed a stimulus to poetic creation. At length in 1819 his uncle gratified the desire of his heart by sending him to the university of Bonu. There, and subsequently at Berlin and Göttingen, he studied law, taking his doctor's degree at Göttingen in 1825. But his thoughts were more given to poetry and kindred subjects than to legal studies. At Bonn A. W. Schlegel helped him to master the technique of his art. At Berlin, in the circle over which Rahel, the wife of Varnheap, you Fine presided he found himself. Varnhagen von Ense, presided, he found himself for the first time in a wholly congenial atmosphere; and the close friendship formed between them lasted till Rahel's death. In the efforts then being made in Berlin by Ganz and others to inspire the Jews with a sense of the value of European culture Heinc also took an active share. In 1321 he published his first volume of Gedichte, which at once arrested the attention of the observant. After unsuccessful essays in tragedy-writing, a second collection of poems, entitled Lyrisches Intermezzo, his Sapphic love-plaint, appeared in 1823. But the general public only became aware that a new writer of the first magnitude had risen in the heavens of literature when in 1826-27 the first and second volumes of the Reisebilder came into their hands. In the latter year Heine likewise celebrated his trimmph as conqueror of a new poetic province in Das Buch der Lieder, which, though consisting almost entirely of poems already published, created throughout Germany such excitement as had not heen since Schiller's Rinder came out. Many of Heine's best songs are as much loved for the beautiful melodies to which they were set by Schumann and Mendelssohn as for their own intrinsic merit trinsic merit.

These two works are Heine's masterpieces; he never wrote anything to excel them. Nearly all his writings are of an occasional nature, either lyrical, or autobiographical, or journalistic, or polemical. But the genius in them is permanent, and in many respects of the highest quality. The great charm of his work is due to the fact that he was a superb literary artist, a consummate master of style in both verse and prose. He was essentially a lyrist; his song has the spontaneity and melody of a skylark's burst, or the quaint naïveté, the pathos, the simple sweetness of the best Volkslieder. His was a very complex and paradoxical nature: he united in himself the passionate energy of a Hebrew prophet, the sensuous feeling of a pagan Greek, and the dreamy sentimentalism of a medieval German. The simplicity of a pure child of nature is blended with

the keenest wit, with an irony that is apt to grow bitterest when his lyric mood is sweetest. and a power of mocking smeasm that cuts sharp and deep. His mastery in the art of self-torture taught him how to lash the follies and absurdities of the conventional world with the roughest raw hide of Mephistophelean scorn. His writing is full of surprises, as capicious as the sea he loved so passionately. His intellect has the suppleness and grace and sincwy strength of a highly-trained athlete, but it neither walks nor glides; it leaps, and turns and doubles with the glancing swiftness of a swallow on wing. He passes from exquisite tenderness to sandonic cymeism, from melancholy sadness to sly insidious lumour, in the twinkling of an eye. Nor is sweet dreamy sentiment in him any hindrance to remarkable precision of thought. But perhaps his strangest quality is an audacity of intellect that he stranges quanty is an audacity of intellect that he sitates at no utterance, that recoils from no jest ou things even the most sacred. His language is terse, clear, and rich in wordpictures, mostly original, seldom glittering with the finsel of mere conventional imagery. One of his favourite devices is to mingle the images of dreamland, unearthly and weird, with images of true poetic beauty forged from the raw ore of commonest poetic beauty forged from the raw ore of commonest reality. But, notwithstanding his delicate poetic sensibility, and the depth and sincerity of his feeling, his poetry had its origin in dissonance of soul; the Weltschmerz had eaten deeply into his heart. The prophet of poetic pain, he scruples not to lay bare his soul to us without reserve; we see the man just as he is, with all his beauties, with all his faults. And these last are neither few nor venial. His sen-nousness often degenerates into obscenity and coarseness, his wit degenerates into obscenity and coarseness, his wit into vulgarity and affectation, his inony into malice and persillage. He becomes cynical, frivolous, a mocker. Not only does he show no sense of reverence himself, he wantonly outrages the revenent feelings of his readers. And he has just 'feminity' enough in his constitution to find pleasure in spiteful personalities.

In June 1825 he had himself haptised a Christian, exchanging his original name Harry for Christian Johann Heinrich, though he used only the last of the three. This step, which proved to be one of the most unfortunate of his life, was not taken from conviction, but simply to seeme for himself the common rights of German citizenship, and to give himself a respectable standing in the world. Heine, however, by this act only alienated from him the esteem of the orthodox among his own people. His revolutionary opinions, and his trenchant and outspoken criticism of the governments of the day, always remained insuperable hindrances to his appointment to any official employment in Prussia, and even in Germany. During the years of early manhood, from 1823 onwards, he was racked by exerneiating headaches, which reacted upon his temper and his mood. Then again, he lived on a strained footing with his Hamburg relatives; they were shrewd business folk, and could see no virtue in poetship, and nothing 'divine' in the poet himself—and Heine was inclined to presume upon his success. He was always greatly harassed by the unscrupulous tyranny of the public censor: his works came from the press grievously maltreated, and against this injustice he could get no remedy. Moreover, he felt himself coming perilonsly near to the doors of a German fortress-prison. No wonder then that, when his enthusiasm was roused by the July revolution in Paris, he tunned his back upon Germany and hastened thither, going into a voluntary exile from which he never returned. But he had not been altogether idle during the six unhappy years since 1825. He had travelled

624HEINE

to England and Italy; he had worked on the editorial staff of Cotta's newspapers in Bavaria; and, besides Das Buch der Lieder, he wrote four volumes in all of Die Reischilder, the last two (1830-31), however, inferior to the others.

In Paris Heine, whose intellectual character and intellectual sympathies were always more French than German, soon made himself at home. He seemed a patron in the minister Thiers, and consorted with the greatest writers and chief celebrities then living in Paris; and yet he often longed to return to the Philistines of Germany. For, in spite of the fact that he railed at his Jewish descent and poured scorn upon his German compatriots, he was always a German at heart and had a secret admiration for the persecuted people from whom he was sprung. Nor was this by any means the only inconsistency in his nature. Nor was this by Though he scoffed at religion, yet was there a deeply religions vein in his composition—the Bible was always a favourite book with bim; though he was deplorably lax in his ideas and practices of morality, he was not insensible to the beauty of purity; and though he ridiculed the vagaries of the romantic school, he cherished a lingering fond-

noss for its ideals.

The July revolution seems to have awakened in Heine the first stirrings of manly serion-ness. He thrined from poetry to politics, with which he had always coquetted ever since he bogan to write. He entered Paris glowing with the inspiration of the rovolution. He assumed the rôle of a tribune of the people, a leader of the cosmopolitan demoeratic movement, the object of which was to effect the union of the peoples of all nations in a brotherhood of liberty and progress. It was under the inspiration of this ideal that he greeted with acelamation the socialistic doctrines of the St Simonists, at all events in so far as economics and religion were concerned. One of the chief caims of his life was to make the French and the Germans acquainted with one another's intellectual and artistic achievements. This was the ground out of which sprang the Franzosische Zastande (1833), a collection of papers on affairs in France, first printed in the Angsharger Allgeneine Zeitung; De l'Allemagne (1835), the French version of Die Romantische Schule (1836) of Germany, that is; and Philosophic und Literatur in Deutschland, forming part of the second of the four volumes of miscellaneous writings entitled Der Salon (1835). acelamation the socialistic doctrines of the St miscellaneous writings entitled Der Salan (1835-40). Heine was always an Ishmaol, not only of literature but also of politics—he would light under nobody's flag but his own; and hence, with his aristocratic instincts and refined taste, he refused to make common cause with the revolutionary fugitives from Germany who found an asylum in Paris. Yet he seems not to have been altogether above the suspicion, if not of insincerity, at least of desiring to win the crown of the political martyr without undergoing the pains of political martyrdom. At all events, his ambiguous attitude brought down upon him the spiteful enmity of his revolutionary compatriots; and their hostility was greatly embittered by the publica-tion of Heine's ungenerous attack upon his former friend and political associate Börne (1840). Nor did he enjoy any better savour of grace from the governments of Germany because of his personal aversion to their dreaded enemies. In 1835 his aversion to their deador enemies. In 1855 his writings, past and prospective together, had been condemned, along with those of the Young Germany school, by the Confederation parliament at Frankfort, and this measure was not repealed until 1842

Although Heino loved liberty with his whole soul, and lived and suffered for it, it seems never to have been anything more to him than a

The truth is he stood on the conromantie ideal. tinental watershed of two wholly different Weltanschauungen ('world-conceptions'), the old world of romantic fendalism and the new world of scientific inquiry and individual freedom. He had nothing but seorn for the tyrannous cra of priesteraft and aristocracy, and nothing but sarcasm and ridicule for the inert mass of commonplace Philistines, with their intellectual anathy and self-satisfied sonnolence. Respecting the future he cherished the most sanguine hopes. He foresaw in imagination the glorious regeneration of the peoples; and Germany was, he believed, the agent of promise destined to effect this great change. Nor must it be imputed to him for blame that he never grasped the problem of the practical realisation of his ideal, that he never thought of the means and forms by and in which this romanticism of the revolution of progress was to be converted into the concrete realism of accomplished fact. For, though he criticised the past and projected his hopes into the fature, his heart was knit to the past with the tenderest associations of feeling, and his sceptical intellect would not allow him to remain blind to the imperfections of his prospicient dreams. It need not therefore excite surprise to find traces of the sentimental declaimer in Heine's war song of liberty, despite his evident carnestness in the cause. For, after all, his love for humanity was beyond all suspicion warm and deep, and his zeal for intellectual freedom unquestionably sincere.

It is last years, from 1844 onwards, were years of great pain and suffering. His book on Börne provoked a kind of hornet's nest about his ears. On the eve of a duol, which it ultimately cost him, he married in due legal form Mathilde Mirat, a Paris grisette, with whom he had been living some years in free love. Then came his uncle Solomon's death, and a quarrel with the family, because of their reinsal to continuo the annuity he had re-ceived from his nucle from the year he settled in Paris. A compromise was effected early in 1847: the payment of the anunity was resumed, Heine pledging himself not to publish anything reflecting on the family. For this reason his *Memoiren*, which he anticipated would be his greatest work, was withheld from publication. The fate of the manuscript in a new court of the manuscript in the property of the manuscript. seript is a mystery. Heine speaks of having destroyed it. Yet it is both asserted and denied that it passed into the possession of his brother (harden). At all approximately approximately asserted as the possession of his brother (harden). that it passed into the possession of his brother (astav. At all events the fragmentary Memoiren published in 1884 can scarcely be part of the original work; it is in all probability a portion of the new version begun by Heine. The revolution of 1848, unlike that of 1830, failed to awaken any enthusiasm in him. Since 1837 his eyes had caused him much pain, and since 1834 he had been confined to his bed by spinal paralysis. He lingered on in exeruciating pain, horne with horote patience and endurance, until 17th February 1856. But no amount or intensity of bodily suffering could break his spirit or impair his creative power; he break his spirit or impair his creative power; he jested and wrote to the last. During these years he published Nove Gedichte and Deutschland, a satirical political poem, in 1844; Atta Troll, the 'swan-song of romanticism,' in 1847; a collection of poems, Romancero, in 1851; and three volumes of Vermischte Schriften, in 1854.

Complete editions of Heine's works have been edited by Strodtmann (21 vols. 1861-66), Karpeles (12 vols. 1865 and 9 vols. 1886-87), and Elster (5 vols. 1887), and in French by himself, assisted by Gérard de Nerval and others (14 vols. 1852 et ecg.). The best biographies of Heine are these by Proelss (1886) and Strodtmann (3d ed. 2 vols. 1884). See also Heines Autobiographie (a mosaio) by Karpeles (1888), and Lives by W. Sharp (1888) and Stigand (1875). Heine's pootry has a fatal fascination for translators. Versiens have been essayed by

Ackerlos (1854), Wallis (1856), Bowring (1859), Lord Lytton, Sir Theodore Martin (1879), J. Geikic (1887), and others. There are translations of parts of the prose works by Leland (1855), Stern (1873), Snodgrass (1882), Storr (1887), Havelock Ellis (1888), R. M'Clintock (1890), &c. The admirable Wit, Wisdom, and Pathos, extracts from Heine's prose, translated by Snodgrass (1879; 2d ed 1888), may also be consulted.

Heineccius, JOHANN GOTTLIEB, a jurist of Germany, born 11th September 1681 at Eisenberg, was professor of Philosophy at Halle from 1713, and from 1720 professor of Law. In the latter capacity he went in 1723 to Francker, and in 1727 to Frankfort-on-the-Oder; but in 1733 returned, as professor of Law and Philosophy, to Halle, where he died 31st Angust 1741. Heineccius belonged to the school of those who treat law in dependence upon philosophical principles. His chief works were Antiquitatum Romanorum Jurisprudentiam Illustrantium Syntagma (1718); Historia Juris Civilis Romani (1733); Elementa Juris Germanici (1735); and Elementa Juris Nature et Gentium (1737; Eng. trans. 1763). His Opera Omnia (9 vols.) were edited by his son in 1771.—Heineccius's hother, JOHANN MICHAELIS HEINECCIUS (1674–1722), was a celebrated pulpit orator in Halle, and the first who studied seals scientifically. On this latter subject he wrote De Veteribus Germanorum aliarumque Nationum Sigillis (1709). August 1741. Heineccius belonged to the school rumque Nationum Sigillis (1709).

Heinsius, Anthony, Dutch statesman, boru at Delft, 22d December 1641, studied law at Leyden, in 1688 became Grand Pensianary of Holland, and as the close friend of William III. (of England) guided Dutch politics till his death, 30th August 1720.

Heinsius, Daniel, a Dutch classical scholar, was born at Ghent, 9th June 1580; was educated at Francker and Leyden (becoming the favourite mupil of Scaliger), and became professor at Leyden. He died 25th February 1655. He edited many Latin classics, and published Latin poems and orations of his own.—His son, Nicolaus (1620-81), obtained distinction both as a diplomatic agent and as a classical scholar.

Heir. In primitive systems of law the heir is the person who performs the sacred rites on the the person who performs the sacred rites on the death of his ancestor, and to whom, as representing his ancestor, the property of the deceased is transferred. There are traces of this primitive conception in the history of Roman law. The later Roman law regards the heir as an universal successor, on whom all the rights and liabilities of the ancestor devolve. An heir width he made hy will in case of interest the might be named by will; in case of intestacy, the law pointed out the line of succession; in some cases equity gave possession to a person who was permitted by a fiction to call himself heir, though not legally entitled to inherit. The liabilities of an heir were restricted by rules which enabled him to separate his own estate from that of the deceased; after Justinian's time this was done by 'making an inventory;' and this 'benefit of inventory' is a feature of modern codes founded on the civil law. It is to be observed that the Roman heir united in himself the rights of the heir, executor, and devisee of English law.

In English law the heir is not the universal successor, but the person who succeeds to the real property of a deceased person not disposed of by will. He is bound by governors to the real will. He is bound by covenants, &c. which have been made binding on the land; the property which descends to him has been made assets for payment of debt generally: but if the personal estate be sufficient, the executor is the person by whom debts should be paid. The heir is ascertained at the moment of death; thus it is not technically correct to speak of the eldest son of a living person as his l

heir; the son is heir-apparent—i.e. it is evident that he will be the heir if he survives. If a father or brother is nearest in succession to a living person, we call him heir presumptive; he will be the heir if he survives, and if no nearer heir is born. An heir must be sought among persons related by consanguinity to the deceased, males being preferred. Of males in the same degree, the eldest is sole heir; females in the same degree succeed as co-heiresses or coparceners. By the Inheritance Act of 1833 it is directed that descent is to be traced from the last purchaser—i.e. the last person who acquired the land otherwise than by descent. Formerly an estate could not ascend from son to father; but the act places the father next in succession after children and other descendants. For a tabular view of the order of succession, see Williams, On Real Property, or Paterson's Compendium of English Property, or Paterson's Compendium of English and Scotch Law. The heirs-general are the heirs ascertained according to the foregoing rules, as distinguished from the restricted class (heirs of the body, heirs-male, heirs-female, &c.) pointed ont by the terms of an entail. Where no heir can be found, the land is escheated to the feudal superior to whom it is held—i.e. usually to the crown. When a person dies intestate, his real estate vests at once in the heir; the heir becomes seised in law without entry on the estate or other formality. The rule which permits an heir to shift the liability for debts to the personal estate was formerly applied even to mortgages; but Locke King's Act, passed in 1854, makes a mortgage debt a charge on the land, unless a contrary intention is expressed.

The law of succession in Ireland is the same as

The law of succession in England.
In Scotch law the term heir is less strictly defined than in English law. It is used to include persons who succeed to movables. It also includes persons who take, not by descent, but by gift; thus, for example, 'heirs of destination' or 'heirs of provision' would be described as devisees or donces in English law. 'Heir apparent,' in Scots law, means the bas not made up his titles, the heir-English law. 'Heir-apparent,' in Scots law, means an heir who has not made up his titles, the heir-apparent of English law being included under the name of heir-presumptive; but since the Conveyancing (Scotland) Act of 1874 the inheritance vests on the death of the owner, and the heir is not required to make up titles. By the same act it is provided that an heir shall not be liable for the delts of his apparent payand the value of the center debts of his ancestor beyond the value of the estate. When heritable property has not been settled or disposed of by the owner, the heir of line is sought among the legitimate kin of the deceased. As in England, males are preferred; of males in the same degree, the eldest is sole heir; females in the together as 'heirs portioners.' But in Scotch, as compared with English law, certain points of difference are to be observed. (1) After descendants are exhausted, it is not the father, but the next younger brother who is next in succession; then the next younger again, and so on to the youngest brother, after whom and his descendants comes the next elder brother, and so on up to the eldest brother. Formerly 'fee of conquest'—i.e. land purchased by the deceased—went to the next elder brother, and so on, in preference to the next younger; but the distinction between conquest and heritage was abolished in 1874. (2) The mother never succeeds in Scotland, nor any relatives who trace through her, except brothers and sisters german. (3) Perthe subsequent marriage of their parents, are permitted to succeed. See the comparative tabular view in Paterson's Compendium.

In England the term 'hereditaments' is used to

denote those parts of a man's property which will, if not disposed of, deseend to the heir. In Scotland if not disposed of, descend to the heir. heritable property includes leaseholds, which in England are treated as personal property; certain classes of annuities are also heritable, which would

in England be personal.

HEIRS-PORTIONERS, in Scotch law, mean either two or more females, being sisters, or sisters and the children, male and female, of deceased sisters, who are entitled to succeed to heritable estate when their ancestor dies without leaving male issue. Thus, if A dies leaving three daughters, all three succeed equally if alive; or if some have already died leaving children, then the children represent the parent, and succeed to the parent's share along with the surviving sisters, all being called heirs-portioners. In such cases the eldest heir-portioner is entitled to the mansion-house of an estate in the country over and above her equal share of the rest. But she has no such right to a heuse in town, or to a country villa. She alone also takes a pecrage or dignity, if there is any in the family. In England coparceners, though resembling heirs-portioners, have not identical rights.

Heirloom (compounded of heir and loom, originally a 'piece of property,' 'furniture'), in English law, means a chattel, or movable thing, which goes to the heir-at-law by special enstom. But the right is obsence. The word is more frequently used now to designate chattels bequeathed or settled so as to be enjoyed by the person for the time being in possession of a family estate or mansion. In Scotland a somewhat similar but by no means identical phrase is used—viz. heirship movables, which is a wider right, and includes the best articles of furniture in the house of a person who left heritable property. The extent of this right is also not clearly settled.

Hejra. See Hegira.

Hel, in Northern Mythology, the goddess of the dead, the sister of the wolf Fenrir, and daughter of the evil-hearted Loki (q.v.), by the giantess Angurboda. The All-father hurled her down into Nilheim, and gave her anthority over the lower world, where she received all who died of sickness and old age. She was of fierce aspect, and had a half black, half flesh-coloured skin. To her were assigned the characteristics of insatiable greed and pitilessness. After the introduction and diffusion of Christianity the ideas personified in Hel gradually merged, among all the races of Scandinavian and German descent, in the local conception of a Hell (q.v.), or dark abode of the dead.

Melder, The, a thriving scaport and strongly-fortified town in the Dutch province of North Holland, 51 miles by rail NNW. of Amsterdam. It stands on the Marsdiep, which connects the Znider Zee and the German Ocean, and at the northern extremity of the North Holland Canal, by which, too, it has connection with Amsterdam. It is one of the strongest fortresses in Holland, having been first fortified by Napoleon in 1811, and has several naval establishments, including an arsenal and a college for cadets, together with a meteorological institute and an excellent harbour. Pop. (1876) 21,328; (1889) 22,716.

Helderberg Formation. In North America a division of the Silurian strata is called (after the Helderberg Range, in the east of New York state) the Lower Helderberg formation. It appears to be on the horizon of the English Ludlow beds. The Upper Helderberg formation of North America is a member of the Lower Devenian strata.

Melen, the most remantic figure of antiquity, famous for her beauty and the misfortunes that followed in her train. She was the daughter of Zeus and Leda, wife of the Spartan king Tyndareus, and owed her more than mertal leveliness to her divine origin. At the age of ten she was

carried off by Thesens and Pirithous, but was soon recovered by her brothers Castor and Polhux, of whom the latter was half an immortal like herself. She was senght in marriage by all the noblest Greek princes, when her father bound by an oath to respect the choice which Helen herself should make. She chose Menclaus, and bore to him the fair Hermione. When she was carried off by Paris, son of Priam of Troy, through the connivance of Aphredite, Menclaus mustered all the Greek princes to revenge the wrong, and thus the famous ten years' Trojan war began. After the death of Paris, not long before the fall of the city, Helen was married to his brother Deiphobus, and she is said to have betrayed him to Menclaus and so regained her husband's love. With him she returned to Sparta, and there lived the rest of her life in quiet happiness. The pair were at last buried together at Therapnæ in Laconia, although, according to the prophecy of Proteus in the Odyssey, they were not to die, but to be translated to Elysium. Another story makes Helon survive Menclans, and be driven out of the Pelopomesus by his sons. She fled to Rhodes, and was there tied to a tree and strangled by Polyxo—a crime expiated only by the Rhodiaus building a temple to her, under the name of Helena Dendritis. Yet another tradition makes her marry Achilles on the island of Leuce, and lear him a son, Emphorion.

In the Homeric poems Helen survives as the personification of all grace and loveliness. She is the daughter of Zens, although there is no mention as yet of the swam story of her mother's wooing by the god. Into the conception of her character in the *Iliad* there enters but little sense of moral responsibility, perhaps because she is a personage that has come into history from the world of mythology, which is ever innocent of morals. In the *Odyssey*, again, we find an incipient sense of moral responsibility, the burden of which is, however, shifted from the shoulders of Helen en te those of some god (Od. xxiii, 222). It is true, however, that *Iliad* ii. 356 and 590 may fairly be interpreted to convey the meaning that Helen was carried away by force, an unwilling victim of Aphrodite. Still the fact remains that there exists a notable difference of tone about this question, and this is not unfairly advanced as one of their strongest arguments by those who claim a later date for the *Odyssey* than the *Iliad* there is a no less distinct sense of moral responsibility, pointing out that in iii. 164 and vi. 357 there is blame distinctly imputed to the gods, and that in iii. 173-176 and vi. 344 Helen takes the burden of the guilt upon her self. Among her warmest apologists are Mr Gladstone and Mr Andrew Lang. Indeed the former makes bold to say that 'her self-abasing and self-renouncing humility come nearer, perhaps, than any other heathen example to the type of Christian penitence.'

Pausanias tells us that on the chest of Cypselus, a work of the 7th eentury n.c., Menelaus was represented as rushing on to kill Helen; and, according to a statement attributed to Stesichorus, the Achiean host were about to kill her when their lands were stayed by the power of her beauty. In his Troucks Euripides makes Helen plead her cause to Menelaus with sophistical rhetoric; in the Helena he makes her remain in Egypt, the Groeks and Trojans fighting merely for a shadow formed by the gods ont of cloud and wind. Again, in his Cyclops the giant speaks of Helen in a manner far removed from the high chivalry and tenderness of Priam and of Heetor. In the Encid we are invited to behold the hero about to slay Helen eronching in terror in the temple of Vesta, and only saved from this infamy by the inter-

position of Venus. 'Hundreds of years later, says Mr Lang, 'Helen found a worthier poet in Quintus Sinymens, who in a later age sang the swan-song of Greek epic ministrelsy. As the personification of all feminiue loveliness, she was conjuned up to play a part in the dream of Fanst, whose words of wonder at the vision of her beauty in Marlowe's tragedy are almost worthy of their theme:

Was this the face that launched a thousand ships, And burnt the topless towers of Ilium! Oh, thou art fairer than the evening air Clad in the beauty of a thousand stars.

The loves of Fanstus and Helen in the second part of Goethe's Faust typify the union of the classical and romantic spirit. She is its spiritual heroine throughout, and by his union with her in the fourth act Faust is raised infinitely rather than degraded in character. Last among the greater poets who have felt across the centurics the spell of Helen's loveliness are Walter Savage Landor and Tennyson; the former in some of the finest lines in his Hellenics commemorates the power of her beauty to disarm the anger of Menclans; the latter has painted for us this 'daughter of the gods, divinely tall and most divinely fair,' in his splendid poem, A Dream of Fair Women. Poets and poetasters since have touched the theme, but descrive not even to be named together with these.

Helen will remain to posterity what she is in the Iliud, one of the most splendid ereations in the whole world of art—a queen of beauty supreme whole world of art—a queen of beauty supreme over the human imagination, as she was when she went at the summons of Itis, all draped in silvery white, with her three maidens, to the walls of Troy. There above the gate sat the venerable King Priam among his counsellors, and all marvelled greatly at her beauty. 'No marvel is it that Trojans and Achaeans suffer long and weary toils for such a woman so wondrous like to the imfor such a woman, so wondrous like to the immortal goddesses' (*Iliad*, iii. 156-158).

See the delightful essay appended to Andrew

Lang's fine pocin, Helen of Troy (1882).

Helena (pronounced, contrary to the classical quantity, Heli'ma; as is also the island St Helena), capital of Montana, is situated among foot-hills in the Prickly Pear Valley, about 14 miles from the Missouri River, with the Rocky Mountains rising behind the city to the south. It is the commercial and railway centre of the state, connected with the Manitola and Northern Pacific railways, and by branch-lines with several mining caums. Many of the streets are wide and straight. camps. Many of the streets are wide and straight shaded with rows of cottonwood-trees, and faced with handsome residences and business premises; and the city has now electric lights and horse-tramways. The most prominent building is the county court-house, containing the Montana government offices; there are also a government assay office, several churches, schools, and libraries, and a Catholic academy and convent, hospital, and asylum for the insane, besides quartz, flour, and lumber mills. A board of trade was organised in Gold was found here in July 1864, the first log-cabins were erected in September, and the camp was known as Last Chance Gulch until December, when it received its present name. The December, when it received its present name. pop. has increased with great rapidity: in 1880 it was 3624; in 1888 it had reached 15,000.

Hel'ena, the name of several female saints of the Catholic Church, the most celebrated of whom is the Empress Helena, wife of Constantius Chlorus, and mother of Constantine the Great. Whether born in Bithynia, Britain, or at Treves, she became a Christian during the youth of Constantine, but it was not till after the defeat of Maxentius that she formally received baptism. The few remaining years of her life she gave to works of benevolence.

In 326, according to almost contemporary tradition, she visited Jerusalem, and there, with Bishop Macarius, discovered the Holy Sepulchre and the cross of Our Loid. Along with it were the crosses of the two thieves, but which was the true cross was shown by its touch restoring a sick lady to health. St Helena died, it is said, a nun, at the age of eighty. Her fe-tival falls on 18th Angust. See Cross, and works cited there.—Two other women of the same name are homomed as saints. The first, whose cult is confined to the Russian Church, was the wife of the Grand-duke Igor, and at her baptism in Constantinople (955) changed her original name, Olga, into Helena; the other was a native of West Gothland, and lived in the 12th century.

Helensburgh, a favourite watering place of Scotland, in the county of Dumbarton, is pleasantly situated on the right bank of the Firth of Clyde, at the entrance to the Gareloch, 4 miles N. of Greenock by water, and 23 miles NW. of Glasgow by a railway opened in 1858. It was founded in 1777 by Sir James Colquhoun, and named after his wife Helen. There is an obelisk to Henry Bell (q.v.). Pop. (1871) 5975; (1881) 7693; but in snumer the numbers are nearly doubled.

Heliac. Heliacal (from Gr. hilios, 'the sun'), enterging from the light of the sun or passing into it. The heliacal rising of a star is when it rises

just before the sun.

Heliand, the name of an Old Saxon poem, dating from the 9th century. Its subject is the dating from the 9th century. Its singlest is the life and work of Christ, constructed as a harmony of the four gospels. The poem is written in alliterative verse, in the spirit of the old Low German popular paetry. Besides being the most important relic of the Old Saxon dialect, it is not without intrinsic literary merit. Of two extant MSS, one is in the British Museum; the other is at Munich. Heyne has issued a critical edition of the text (3d at 1892), and there is a translation intrinsic. ed. 1883), and there is a translation into modern High German by Simrock (3d ed. 1882).

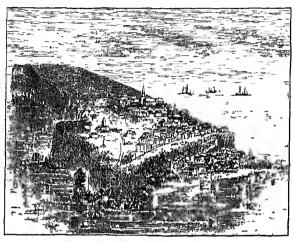
Helianthus. and Sunflower. See JERUSALEM ARTICHOKE,

Helicidie (Gr. helix, 'a spiral'), a large family of terrestrial air-breathing (pulmonate) gasteropods, of which Snails (q.v.) are familiar examples.

Helicon, a mountain-range (5736 feet) in the south-west of Bootia, in ancient Greece, was celebrated as the favourite seat of the Muses. At the foot of the range stood the village of Ascia, the residence of Hesiod, and the scat of the earliest school of poetry in Greece. On the slopes were the famous fountains of Aganippe and Hippocrene, whose waters were reputed to give poetic inspira-

Heligoland (Ger. Helgoland; native name, det Lunu, 'the Land'), a small island in the North det Lunn, 'the Land'), a small stand in the North Sea, belonging to Great Britain, is situated about 36 miles NW. of the month of the Elbe, in 54' 11' N. lat. and 7° 51' E. long. It is about a mile long from north to south, and one-third of a mile from east to west, and three-fourths of a square mile in superficial area. The *Oberland* is a rock 206 feet in height, on which is abtained by 199 there or by and access to which is obtained by 192 steps or by a steam-lift; while the *Unterland* is a patch of shore with 70 houses south-east of the cliff. The resident population was (1860) 2172, and (1881) 2001; though in the bathing season Heligoland is visited by upwards of 12,000 summer visitors—attracted by the admirable bathing facilities offered, not by Heligoland itself, but by the 'Sandy Island,' or Dune, a small sandhank with scrubby vegetation, separated from the main island by a channel about a mile wide. Sandy Island was

formerly connected by hand, but the imonds of the sea have gradually isolated it. The same agent, together with the heavy rainfall, the variations in the weather, and the disintegrating power of the frost, are still reducing the size of Heligoland itself. The western chilf has, according to Lindenann, receded 7 feet in the forty years preceding 1888. The soil on the flat top of the rock of



Holigoland.

Heligoland sullices for a little pasture-hand, and for grawing potatoes and cabbages. for grawing potatoes and cappages, some sheep on the island, and a few cows. Wheelof the Unterland gives partial shelter to two hur-bours, one to the north, the other to the south. The inhabitants are supported chiefly by the labster and other fisheries, and by the summer visitors, pilotage having almost ceased, and the public gaming-tables, established in 1830, baving been suppressed in 1871. There is mactically no poverty, disease, or erime, and the people are very long lived. A lighthouse stands on the cliff near the village. The island, which was taken by the British from the Danes in 1807, and was formally ceded to England in 1814, has an English governor. Heligolandish, a dialectic varioty of Nonth Frisian, is the native tongue, but German is currently spoken, and English is also taught in the school. There is no garrison. Steamboats run to and from the North Fisian islands of Sylt and Fohr, and Hamburg.—Heligoland was anciently sacred to the goldess Hertha. According to tradition, the island was once vastly larger, great tracks of country having been swallowed up by the sea between 700 a.D. and the end of the 17th century. Christianity was first preached here by St Will-brod in the 7th century, after whose time tho island received its present name of Holy Land. The inhabitants of Heligoland are divided into two classes, differing both in race and occupationthe one being fishers, the other tradespeople, small shopkeepers, &c. The first are Frisians, a tall and shopkeepers, &c. The first are Frisians, a tall and muscular race of hardy seamen, simple and priminuscular race of hardy scamen, simple and primitive in their bubits, and holding land-labour and soldiers in contempt. The merchant class consists of immigrants from Hamburg and other places on the mainland, or their descendants. There is a curions and pictnesque church, on the roof of which is still the Dannebrog painted by the Danish anthantics when the island belonged to Denmark. The people are very loyal to Great Britain, and are now almost annually contributing sailors to the royal navy; for fixed military service, such as is required from

the German islands of Sylt, &c., they have a remarkable althorrence. The revenue in 1888 was slightly over £8000, and the expenditure over £7000. See Black's Heligoland (1888); and Lindemann, Die Nordseensel Helgoland (1889).—In the days of the early kings of Norway (10th eentiny onwaids) the name Helgeland was given to a district in that country; it lay north of Throndhjem, extending from about 65° N. lat. to the

neighbourhood of Synitisen glacier,

Heliocentric, in Astronomy, having the sun (Gr. hillos) as centre of reference; the heliocentric place of a planet being opposed to its geocentric (Gr. ge, 'earth'). its place as seen from the earth.

Heliodorus, the earliest and best of the Greek romance writers, was born at Emesa, in Syria. He was a sophist of the second half of the 3d century A.D., but has second half of the 3d century A.D., but hose sometimes been confounded with a bishop of Trikka, in Thessaly (titea 390). The work by which he is known is entitled Ethiopica, in ten books, narrating in poetic prose, at times with almost epic beauty and simplicity, the loves of Theageness and Charielea. The work is distinguished from the blanch facely towards the control of the co guished from the later Greek commices by its vigour and its pure morality. See Rohde, Der Griechische Roman (1876). There are editions by Bekker (1855) and Hischig in Scriptores Erotici (1856).

Helioga balus, or ELMABALUS, emperor of Rome, was born at Emesa in 204 His real name was Varius Avitus Bassianus, but having, when a more child, been appointed high-priest of the Syro-Phornician sun-god Elagabal, he assumed the name of that deity. Soon after the death of his consin Caracalla, Heliogabalus was proclaimed emperor by the suldiers, in apposition to the legitimate sovereign, Macrims, who had become chroxious to the troops from his parimony and the soverity of his discipline, The rivals met in battle on the borders of Syria and Physicia in 218 a.p. Magripus was defeated and Phonicia in 218 A.D. Macrims was defeated, and Heliogabalus, proceeding to Rome, quietly assumed the purple. His reign, which lasted rather more than three years and nine months, was infamous for the gluttony and the nearly imparalleled delaucheries of every kind in which he indulged. He was murdered in an insurcession of the protonium in 200 A.D. and was suction of the pretorians in 222 A.D., and was succeeded by his cousin and adopted son, Alexander Severu4

Mellography, a method of communicating swiftly between distant points by means of the sun's rays reflected from mirrors. Either successive flashes or obscurations of a continuous reflection of the sun's light may be combined so as to read like Morse's telegraphic system (see Telegraph). Heliography may be used for geodetic measure ment, or for military and other signalling. The instanments which contain the mirrors are variously called heliograph and heliostat. The instruments have been so perfectly contrived as to be available at a distance of over 100 miles (in California); French engineers in Algeria have found the signals serviceable at a distance of 170 miles. As early as the 11th century A.D. Algera possessed a system of heliographs: 'At the summit of this tower was an apparatus of mirron, corresponding to similar ones established in different directions, by aid of which one could communicate rapidly with all the towns from one end of the empire to the other (Athenaum, 28th January 1882). Recently there has been a great development in heliography, or sun-telegraphy, for signal-ling massages, between the sections of an army in the ling messages between the sections of an army in the

field, as during the British campaign in Afghanistan in 1880. Drummond's and Begbie's heliostats, and the heliographs (differing in details) of Mance and Anderson, are tavourably known. The name heliostat was originally used of an Equatorial (q.v.) revolving on its polar axis.—Heliotrope was the name given to a mirror placed at the distant station, and adjusted by clockwork, so that at a particular hour of the day (arranged beforehand) the light of the sun shall be reflected from the mirror directly to the surveyor's station. See Signalling.

Heliogravure. See AUTOTYPE.

Heliometer ('sun-measurer') is an instrument invented by Savery and Bonguer in 1743-48, by means of which the diameters of the heavenly bodies can be measured with great accuracy. As improved by Dollond, the object-lens of the instrument is in two halves, each of which will form a perfect image in the focus of the eyepiece; and the images may be made to diverge, coincide, or overlap each other, by varying the distance between the half-lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images may touch each other; then the distance between the centres of the two object-glasses measured in seconds gives the diameter of the sun. Fraunhofer made many remarkable improvements on the heliometer.

Heliopolis ('city of the snn'), the Greek name of the city called by the Egyptians On, An, stood on the cast side of the Pelusiac hanch of the Nile, near the apex of the Delta, and was one of the most ancient and important of Egyptian cities. It was the chief scat of the wisdom of the Egyptians, and Thales, Plato, and Solon are reported to have learnt from its priests. Manetho, the historiographer of Egypt, was chief-priest here, an office filled centuries earlier by the father-in-law of the Hebrew Joseph. One of the red granite ohelisks long famous as Pharaoh's Needles is still standing near the hamlet of Matarieh, 8 miles N. of Cairo. It is 70 feet high, and bears the name of Usmtesen I., the second king of the twelfth dynasty. The ohelisk called 'Cleopatra's needle,' brought in 1878 to England, and that taken to New York in 1880, were originally brought to Alexandria from this city. For the Syrian Heliopolis, see BAALBEK.

Helios, the Greek name of the sun (the Roman Sol), who was worshipped as a god. According to Homer, he was a son of the Titan Hyperion and of Theia, and a brother of Selene or Eos. He is described by the same poet as giving light both to gods and men. He rises in the east, from the marshy borders of Oceanus, into whose dark abysses he also sinks at evening. The later poets, however, gave him a splendid palace in the east, somewhere below Colchis, and describe him as being conveyed, after the termination of the bunning labours of the day, in a winged boat of gold, along the northern coasts of the sea back to Colchis. After the time of Eschylus, he began to be identified with Apollo or Pholms, but the identification was never complete. His worship was widely spread. He had temples in Connth, Argos, Trezene, Elis, and many other cities, but his principal seat was Rhodes, where a four-team was annually sacrificed to him. The island of Trinacria (Sicily) was also sacred to Helios, and here his daughters, Phoetusa and Lampetia, kept his flocks of sheep and oxen. It was customary to offer up white lambs or boars on his altars. The animals sacred to him were horses, wolves, cocks, and eagles.

Helioscope, a telescope for observing the sun without injury to the eyes, by means of blackened glass or mirrors that reflect only a part of the light.

Heliotrope (*Heliotropium*), a genus of plants of the natural order Boraginew (q.v.); of the section, sometimes made a distinct order, Ehnetiacew, the fruit separating only when ripe into four earpels. Many of the species have fragnant flowers. The Pernvian Heliotrope (*H. Pernvianum*), a shrub with oblong-lanceolate wrinkled



Common Heliotrope (Heliotropium Europæum).

leaves and small lilae-blue flowers, is in almost univer-al cultivation for its fragrance, which resembles that of vanilla or cherry-pie. Many seminal varieties of this species are cultivated in gardens. They delight in rich light soil, and are propagated by cuttings of the young growing shoots in a moist warm atmosphere. The European or Common Heliatope (H. Europa um), a native of the south and west of Europe, is an annual with small white, or rarely pale red, flowers. Large quantities of the flowers are used by perfumers for making scents.—Classical fable accounts for the name heliotrope (Gr. hēlos, 'the sun,' and trepē, 'I tun') by representing Clytia as turned into this flower through gazing at Apollo.

Heliotrope, or BLOODSTONE, a variety of chalcedony or of jasper, of a green colour with red spots. The finest heliotropes consist of chalcedony, and are translucent, at least at the edges; the jasper bloodstones are opaque. Heliotrope is found in many parts of the world, as in Scotland, but the finest specimens of this mineral are brought from the southern parts of Asia. It was well known to the ancients, who obtained it chiefly from Ethiopia and Cyprus. It is much used for boxes, seals, &c.; and those specimens are most valued which possess most translucency, and in which the red spots are bright and well distributed. It was much used in the early ages of the Christian church for the engraving of sacred subjects, the figures being so managed that the red spots should represent drops of blood. The name heliotrope (Gr. hēlios, 'the sun;' tropē, 'a turning') seems to have been given to this mineral because when immersed in water in the face of the sun it was said to make the image of that luminary in it appear of a blood-red colour. The heliotrope, thus described by Pliny, must have shown very large spots or veins of red.

Heliotrope, an instrument. See Helio-GRAPHY.

Heliotropism ('turning towards the sun'). When a seedling plant is placed in a transparent vessel of water within reach of the light of a window, the stem and leaves gradually bend towards, and the

roots from, the light. The former phenomenon is termed positive, and the latter negative, heliotropism. The shoots and leaves of nearly all plants turn towards the light, and the turning of the sunflawer towards the sun is familiar to every one. In the case of organs which are positively heliotropic the growth of the side next the light is retarded, and that of the opposite side increased; the result of these combined actions is a concavity on the former, and a convexity on the latter, thus causing a curvature towards the light. In the case of roots these actions are reversed. That these results are brought about by the action of light is evident; the cells on the concave side become less, while those on the convex side become more, turgid, thus foreing the organ to bend; but the cause of turgescence is unknown.

Heliotype. See Photography.

IIcliozoa, or 'sun-animalcules,' a class of Protozoa of the Rhizopad type—i.e. provided with protrading processes of living matter. These processes are unlike those of the Amebre (q.v.) in being slender and radiant, unlike those of Foraminifera (q.v.) in being stuhle and rarely interlaced. The unit-mass or cell of which the Heliozoon consists is globular and stable, with one nucleus or with many, and usually with vacuales both contractile and non-contractile. There is generally a 'skeleton,' gelatinous or siliceous, and in the latter case either continuous or camposed of loose spicules. Multiplication is effected by division of the cell inte two, or by lundding, or by that internal fission known as spore-formation. In some cases the spores or young Heliozoa are flagolate, and thus very unlike the comparatively slow and passive adults. In a few instances Heliazoa have been seen united in colonics. The majority live in fresh water, but some are marine. Common examples are Actinospherium, Actinophrys, Raphidiophrys, and Clabrulina. See Protozoa; Bütschli's Protozoa in Brunn's Thierreich: Archer, Quart, Journ. Miero. Sci. 1876-77.

Mclix (Gr., 'a snail'), a term used for a genus of molluses, including the land-snails; for part of the luman ear (see Eart); and for a small volute or twist in the capital of a Corinthian column.

Mell, the place of torment, and the condition to which the finally impenitent are consigned after death, located by all the Fathers in the centre of the carth, although St Thomas says no one, without a special revelation on the point, can say where it is. Unfortunately for clearness of ideas on the subject the word has been from the beginning employed in the most various senses, and the confusion has been only deepened by the fact that in our Authorised Version it has been employed to render three wholly different words, Sheel or Ilades, Cehenna, and once Tartarus (2 Peter, ii. 4). The word Sheel occurs in the Old Testament sixty-five times, and is rendered 'hell' thirty-one times, 'grave' thirty-one times, and 'pit' three times. Its original meaning seems strictly to have implied merely the shadowy under-world, a deep and gloomy cavern considered as the abode of the souls of the doad, the common receptacle for all mankind, not yet definitely differentiated into two distinct classes with the more rigorous logic of a later age and a fuller revelation. The Hebrew conception of Sheel was merely a kind of vague shadow of past life, in which the soul was shut off from any communion with the living, although we see in its loftier expressions of religious aspiration the impassioned desire for an unbroken continuity of union with God vising into a vision so vivid that it almost realises itself (Job, xiv. 13-15; cf. also Ps. xvi. 10, xlix. 16, lxxiii. 24). In these passages the Psalmists, in the heights of spiritual elevation and conscious-

ness of living communion with God, leap in vision across the separating grave into a real conviction of living continuity of fellowship that rises into the region of true immortality; Joh, in the perplexity of despair between his present calamities and the immediate expectation of death before God's favour is renewed to him, yet absorbed with the idea that God cannot belie himself by finally forgetting his righteons servant and his former fellowship, grasps the notion of immortality as a necessity of God's inherent righteonsness, and thus reaches the loftiest spiritual conception of Christianity—a living union possible between man and God, by a process of pure religious abstraction.

The hope of a future life, in Old Testament prophecy, hardly extended heyond the perfected glory of the Israelitic theocraey under conditions which were essentially earthly, but yet already partly olevated into the supernatural. The condition of the dead continued to he represented as a shadowy existence in Sheol—an existence without special religious significance and value.

In post-exilic Judaism, on the contrary, the faith in the resurrection of the pious dead (in connection with the Messianic time of salvation) developed itself out of these two elements: (a) from the more individual conception of the covenant-relation and from the postalate of retribution in the kingdom of the Messiah, and (b) from the influences of the Persian faith in the resurrection, which co-operated with the former and furnished to them a definite form. While this faith, through the Pharisces, became a popular element of the Messianio hope, the Sadducces beld fast to the old Hebrew conception of Sheel, and the Essenes assumed the Hellenistic doctrine of the incorporeal immortality of souls in a higher state of being, a doctrine which fitted in with the Essene spiritualism.

In consequence of this developed eschatology, there then entered also into the conception of Sheol the distinction of different moral retributive states: (a) for the rightcons in Paradise or Abraham's hosom; (b) for the godless in Gehenna.

The Sentuagint equivalent for Sheol is Hades, a word which occurs in the New Testament eleven times, and in ten of these is rendered 'hell,' the sole exception heing I Cor. xv. 55. Again, 'hell' is used as the rendering for Geheuna twelve times. Originally as in the Old Testament usage the latter word simply signilied the Valley of Hinnon near the city, which had been defiled by the aboutinations of human sacrifice in the Moloch worship of Ahaz and Manasseh. It became later a kind of receptacle for filth, the combustible portions of which, according to some authorities, were consumed with fire. Hence in later times it became an image of the place of punishment, 'where their worm dieth not, and the fire is not quenched.' The word Tophet occurs in the Old Testament nine times, and apparently meant originally a grove or garden in Hinnon; afterwards defiled and polluted by idolatries, it became to the Rabbis a fit symbol for all abounnations, the very gate or pit of hell. Almost all the passages in which the term Gehenna occurs are hopelessly metaphorical in character, on which it seems unsafe to build too rigorous dogmatic definitions: in such investigations should never be forgotten the saving caution, 'Theologia parabolica non est demonstrativa.' No less difficult is the Greek word aionios (aion, Hebrew olam), varionsly rendered by 'everlasting' and 'eternal, varionsly rendered by 'everlasting' and 'eternal, and in some of those cases it is certainly empleyed of periods limited in duration. The word aion dees not necessarily connato what is understood by 'eternity' either in classical or Hellenistic Greek, and in the Oxford Library of the Fathers we find its adjective rendered very properly by 'secular.'

HELL 631

So that St Augustine's famous argument (De Civ. Dei, xxi. 23), besides its unworthiness, is strictly a non sequitur—that because uionios zoc is assumed to mean 'endless life,' therefore aionios kolasis must mean 'endless punishment.' As Haupt says, eternal life' is not to St John a mere term for unbroken continuauee in being, as though it were simply equivalent to the indissoluble life (zoē akatalutos) of Heb. v. 6; it does not define the form of this life so much as the nature and meaning of it; zoō aiōnios is, in other words, a description of divine life, of the life which is in God, and which by God is communicated. At the same time the plain exegesis of the greater number of relevant passages in the New Testament points rather to everlasting than to merely wonian rewards and punishments, and indeed it is difficult to resist the conviction that such phrases as the olethros aionios ('destruction') of 1 Thess. v. 3, and 2 Thess. i. 9, and the telos of Philippians, iii. 19, refer to endless, hopeless, irremediable doom.

The same uncertainty is reproduced in the Authorised Version in the words used to express The words krino, krisis, and krima occur in the New Testament some 190 times; the words katakrinō, katakrisis, katakrima, 24 times. In all but fifteen places these words are properly enough rendered by 'judge' and 'condemn,' and their derivatives; in the rest 'dann' and 'dannation' have been employed, sometimes as incongruously as in 1 Cor. xi. 29; 1 Tim. v. 12; and Rom. xiv. 23.

Enough has been said to show the difficulties in the exegesis of the passages on which the dogmas of the church about the future punishment of the impenitent are based, and it only remains to state here the chief views of eschatology now prevalent, and to sketch briefly the development of these in the history of dogma. It does not belong to us to discuss the abstract theory of future retribution-a postulate of all religions whether rudimentary or postulate of all religious whether intimentary of advanced—nor to attempt to justify anew the ways of God to man by distinguishing ex cathedra what is of faith and what is mere human speculation.

I. The orthodox theory, both in the Eastern and Western churches, is that at death there is

passed upon every impenitent sinner an irreversible sentence to torture of both his moral and physical dreadful in intensity, yet proportioned in degree to the depths of the iniquity of the individual, whose sufferings include within them both the 'pain of loss' and the 'pain of sense.' The former implies the remorseful consciousness of the loss of all good; the latter embraces all forms of physical torment, as by material fire, utter abandonment and alienation from God, and the perpetual society of lost men and devils. The pains of hell for ever without any mitigation or hope of escape are the fate of all whose faith during their life on earth has not come up to the minimum required by the rigorous justice of God. Such has been the orthodox belief of almost the entire Christian church until now, and its fathers and theologians, from St Augustine and St Thomas Aquinas down to Jeremy Taylor, Thomas Boston, and Jonathan Edwards, have lavished all the wealth of impassioned rhetoric upon the description of its horrors. Medieval painters like Orcagna devoted all the riches of a grotesque imagination to the portrayal of its material torments infinite in variety as well as awful in intensity, and the famous fresco in the Campo Santo at Pisa shows what a really great artist could make of such a theme. Indeed, the words which Dante saw in his vision above the gloomy portals of hell, 'All hope abandon ye who enter here,' merely describe with literal truth the traditional belief of the Christian church.

St Augustine even found himself, in accordance with his views of predestination, compelled to postulate the eternal dannation of unbaptised infants. Although he is disposed to look upon this condemnation as mitissima and tolerabilior, he opposed the doctrine condemned by the synod of Carthage (419 A.D.) of an intermediate state in which unbaptised infants were said to be (Limbus infuntum). Dante sees these hapless victims of fate in the first circle of the Interno, and indeed this belief was held by the entire medieval church; while the eternal damnation of non-elect infants still stands implied in the famous Confession of Faith of the Westminster Divines. St Thomas Aquinas supposes that the bliss of the saved will he heightened by their witnessing the punishment of the wicked; and Jonathan Edwards thus ex-presses the same monstrons notion, 'the view of the misery of the damned will double the ardour of the love and gratitude of the saints in heaven. To the Catholic the horrors of hell are enormously mitigated by the notion of an intermediate state of punitive probation, in which the souls of such as have not died in mortal sin are purged from the guilt of earthly sin, and made fit for translation to heaven to the companionship of God and his elect

See PURGATORY. saints.

II. The second belief in importance is that associated with the great name of Origen, and variously termed Universalism, Restoration, or the Larger Hope—viz. that all men ultimately will be saved. Origen believed that the punishment of hell itself was but purgatorial in its character, that, its purifying effect once attained, the punishment would cease for all, most probably even for the devils themselves, and that the duration in each case would be proportioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness is the theory of the Apocutastasis to which so many of the early Cluistian writers allude. It was taught definitely by Gregory of Nyssa, who foretells in glowing words a time when there shall no longer be a sinner in the universe, and the war between good and evil shall be ended, and the nature of evil shall pass into nothingness, and the divine and unningled goodness shall embrace all intelligent existence. Theodore of Mopsustia teaches that in the world to come 'those who have done evil all their life long will be made worthy of the sweetness of the divine bounty. For never would Christ have said "until thou hast paid the attermost farthing" unless it thou hast paid the intermost farthing," unless it were possible for us to be cleansed when we have paid the penalty. Nor would be have spoken of the many stripes and few unless after men had borne the punishment of their sins they might afterwards hope for pardon.' Gregory of Nazianzus seems to have held the same opinion; and St Jerome, which have not beautiful to be larget treats it with who does not accept it, at least treats it with respect, and adds 'human frailty cannot know the judgment of God, nor venture to form an opinion of the greatness and the measure of his punishment. The Reformers followed Augustine except in so far as they rejected Purgatory, first taught distinctly in his treatise De Doctrina Christiana. Of theologians inclined to the wider hope it is enough to name Bengel, Henry More, Rothe, Neander, Tholuck, and Martensen; and among ourselves Maurice, Milman, Kingsley, Alford, Erskine of Linlathen, Thirlwall, Plumptre, and Farrar. The last has argued for the cause with equal learning and eloquence.

In class connection with the theory of univer-

In close connection with the theory of universalism, as suggesting inferences all tending to the possibility of purification and educational discipline being mingled with the penalty for sin beyond the grave, is the much-debated question of the descent of Christ into hell to preach to the spirits 632 HELL

in prison. The earliest account of this as a historical fact is given by Eusobius, but it soon appears with funtastic elaboration in the apocryphal gospel of Nicodemus, and a statement of helici in it was inserted in the Apostles' Creed, in the earlier forms of which, however, it does not appear, any more than it does in the creeds of Irenaus, (higen, Ter-Yet we find it distinctly taught by Ignatins, Hermas, Justin Martyr, Irenwas, Tertullian, Cloment of Alexandria, Origen, Cyprian, Cyril, Ambrose, Jerone, Augustine, and Chrysostom. It was maintained in answer to Arian and Apollinwas mantained in answer to Arian and Aponin-arian heresies, as proving the true humanity and the real death of Christ. Besides I Peter, iii. 19, the other passages in Scripture considered to support this belief are Eph. iv. 9, and Acts, ii. 27-31. Tertullian asserts that heaven is not open till the end of the world, and that all men are in Hades, either comforted or tormented, and that the purpose of our Lord's descent was that the patriarchs should be made partakers of him. The belief soon came to be widely held that the patriarchs and prophets were in Hades, but passed with Christ into Paradise—the germ of the medieval doctrine of the *Limbus patrum*. Augustine seems to have believed that Christ's preaching was effective in saving some souls which were in torment. Cyril of Alexandria describes Christ as having by his descent 'apoiled Hades utterly, and thrown open to the spirits of those that slept the gates that none may escape from, and leaving the devil there in his solitude and desolation, having risen agrain. To him it was the supremest proof of Christ's love to man that the Cross, the symbol of deliverance, had been raised in Hades itself. The theme early became a subject of Christian art, as the 'Harrowing of Hell' was a favourite subject of our own medieval writers of mysteries, and takes its place in the great Divina Commedia of Dante. The Reformers felt that the doctrine lent support to the dogma of Purgatory, and some, as Calvin, taught that the descent into Hades meant only the terrible anguish with which the soul of Christ was tried, equalling in its intensity for the time the sufferings of the dumned, while others merely admitted the fact without allowing others merely admitted the fact without allowing themselves to define anything as to its purpose or result. Hammond, Pearson, and Barrow maintain the only meaning of St Peter's words to be that our Lord by his Holy Spirit, inspiring Noah, preached to the disabedient antediluvians, who are now for their disabedience inprisaned in hell—an explanation that hell elegals convered to Lerone explanation that had already occurred to Jerome and Augustine. Bishop Harold Browne observes that on this subject Pearson has written less lagieally than is his wont, and says well that the real difficulty consists in the fact that the proclamation of the finishing of the great work of salvation is represented by St Peter as having been addressed to these antediluvian penitents, while no mention is made of the penitents of later ages, who are equally interested in the tidings. It can hardly be denied that the patristic interpretation is most in harmony with an honest exegesis of the passage in St Peter's episile, but here it may be enough to summarise the opinions of two great Protestant theologians, Martensen and Dorner.

The former says that departed souls live a deep spiritual life, for the kingdom of the dead is a kingdom of subjectivity, of remembrance in the full sense of the word. At death the soul finds itself in a world of pure realities; the manifold voices of the world, which during this earthly life sounded together with the voices of eternity, grow dumb, and the hely voice now sounds alone, no longer deadened by the tunnult of the world; and hence the realm of the dead becomes a realm of judg-

ment. Departed spirits thus not only live and move in the elements of bliss or woc which they have formed and prepared for themselves in time, but they continue to receive and work out a new state of consciousness, because they continue spiritually to mould and govern themselves in relation to the new manifestation of the divine will

now first presented to their view.

Of the famous passage of St Peter, Dorner says that Peter really contemplates Christ after his death, probably before his resurrection, as active in the region of the dead, and therefore not in the place of torment, but in the intermediate region. There is an Intermediate state before the decision of the Judgment. The Reformation, occupied chiefly with opposition to the Romish Purgatory, leaped over, as it were, the middle state—i.e. left at rest the questions presenting themselves here, gazing with unblenched eye only at the antithesis between the saved and the damned, on the supposition (retained without inquiry), in opposition to more definitely decided with his departme from this present life. This is in keeping with the high estimation put on the moral worth of the earthly life. Nevertheless, the view is untenable, and that even on moral grounds. Not merely would nothing of essential importance remain for the Judgment if every one entered the place of his started destiny, directly after death, but in that case also no space would be left for progressive growth of believers, who yet are not sinless at the moment of death. If they are conceived as holy directly after death, sanctification would be effected by separation from the body; the seat, therefore, of evil must be found in the body, and sanctification would be realised through a mere suffering of death as a physical process instead of through the will. Add to this that the absoluteness of Christianity demands that no one be judged before Christianity has been made accessible and brought home to him. But this is not the ease in this life with millions of human beings, as the heathen in central Africa. Nay, even within the church there are periods and circles where the gospel does not really approach men as that which it is. Moreover, those dying in childhood have not been able to decide personally for Christianity. The passages which make the pions enter at once a better place exclude a Purgatory as a place of punishment or penance, but by no means exclude a growth in perfection and blessedness. Even the departed righteons are not quite perfect before the resurrection. Their souls must still long for the dominion of Christ and the consummation of God's kingdom. There is, therefore, a status intermedius even for believers, not an instantaneous passage into perfect blesseduess.

How closely this touches the question of the admissibility of Prayers for the Dead will be at once apparent, although that subject hardly falls to be discussed here. It was an ancient pre-Christian enstom to ollor up prayers for the dead, and we early find traces of it in the Christian Church. These St Augustine thought might at least scenre for the lost a tolorabilior damnatio.

III. Another view, not without its adherents, is that of Conditional Immortality or Annihilationalism, according to which final destruction and net cudless suffering is the doom of the finally impentent. It of course traverses the belief in the inherent immortality of the soul, the instinctive hope and belief of all mankind everywhore; and, if it saves the mind from the horror of cudless torment, necessitates the belief that God will raiso up the impenitent from the dead only to be tormented and at last destroyed. Its adherents depend for proof on the literal and assumed interpretation of

HELL 633

a few passages of Scripture, and count among its modern supporters Watts, Isaac Taylor, and

Whately.

The principal theories of future retribution having thus been briefly sketched, it only remains to say a few words more generally upon the significance of New Testament eschatology, and the mode of its development; and here we shall follow closely in the track of Pfleidercr. The whole of the Primitive-Christian community lived in the expectation of the speedy return of Cluist and the advent of his visible kingdom of glory upon earth. Further, the Apocalypse of John (following the Jewish apocalyptic—e.g. the Book of Enoch) distinguished between (1) the earthly kingdom of Christ (of limited duration—1000 years, hence Chiliasm), beginning with the Parousia and First Basurrection and (2) the deficition and of the Resurrection, and (2) the definitive end of the world (Rev. xx. 2-7) following therenpon, which, through a second general resurrection and judgment of the world, together with the annihilation of the kingdom of Safan, will introduce the eternal completion of the kingdom of God: which completion, moreover, the Apocalypse also still represents in accordance with the analogy of the Israelitish theocracy—descent of the heavenly Jerusalem (Rev. xxi.).

In the Pauline eschutology two essentially different views cross each other: (a) On the one hand, the specifically Jewish-Christian expectation (handed down in the Christian community) of the following minaculous catastrophes: Paronsia, Earthly Reign of Christ, Resurrection of Christians, General Judgment (1 Cor. vv. 23-26; 1 Thess. iv. 13-18)—under the assumption of which the state of souls between death and resurrection appears as a middle state, like sleep; on the other hand (b) a result of the specifically Pauliue doctrine of the Spirit of Christ—viz. the expectation of a glorified state of on this side the grave, and therefore beginning immediately after death to unfold its fullness in the manifestation of a hody-of-light (Rom. viii. 10 et seq., and 17-23; 1 Cor. v. 1 et seq.; Phil. iii. 20 et seq.). The latter mode of conception appeared first in the later Pauline epistles, without however being made to harmonise with the first. The definitive end of the world Paul conceives as introduced by the subjugation of all the enemies of God, which is carried out under the earthly rule of Christ as king (whether through their conversion or even through their complete aunihilation), and finally of even death itself. On this follows the surrender of the kingdom by Christ to God and the dentities of Callelons in all creation even to cut dominion of God alone in all creation, even to outward nature—glorified and serving God in freedom (1 Cor. xv. 27 et seq.; Rom. viii. 21).

The ideal tendency of the Pauliuc eschatology was strengthened from the side of Hellenism, under whose influence already the Epistle to the Hobrews had combined the future Messianic world of Jewish-Christianity with the higher, heavenly, or ideal world, and had immediately attached the perfect state to the death of the individual (Heb. xii. 23;

iv. 9 et seq.; ix. 27).
In John the idealising spiritualisation of the traditional eschatology goes still further by transforming the *external* perfection (in the future) into the internal perfecting of the religious Christian life of the present church. As already the 'coming again' of Christ, in the valedictory discourses, wavers between future Parousia and present Coming in the Spirit (John, xiv. 16), so also the 'eternal life' of believers has now already become realised in the present in their corporate unity with God and Christ, which is above death and judgment, and which receives no essential addition even through

the future resurrection to life (which, withal, is here firmly adhered to). In like manner, also, Judgment realises itself aheady in the historical life of the community, continuously, in the process of separation betweet faith and unbelief, sonship to God and to the Devil-which separation will find only its full outward manifestation in the future two-sided resurrection (John, xvii. 3; xi. 25 et seq.; vi. 40; v. 24 et seq.; iii. 17-21, 36; xvi. 8 et seq.) In the spiritualisation of eschatology Origen only

went further on the line pursued by the Gospel of John. The other Church Fathers in opposition to Gnostic spiritualism laid stress all the more decisively on the sensuous reality of the last things, even to the Pharisaic fleshly identity of the resurrection body with the earthly one. Only it must be noted that Chiliasm, as an apocalyptic hope for the future, was from the 3d century all the more decisively rejected by the church, the more its idea realised itself in the church's own dominion over the world, and the Parousia of Christ was pushed forward from the near future to the far-

off distance.

The conception of the Ignis Purgatorius, derived from the Platonic doctaine of the purifying pen-auces of souls in the world beyond the grave, was early adopted by individuals, but from the time of Gregory I. became a part of the Catholic Church's faith, closely connected with the Mass and with the church's penitential discipline, for which reasons it was rejected by Protestant orthodoxy, which makes the unchangeable and endless retributive states of salvation and damuation ensue immediately on the death of the individual, between which states there is no third, though different degrees within both are admitted. In no other respect does the Protestant eschatology differ from the Catholic. Chiliasm is rejected as a Jewish error; but the Parousia of Christ with general resurrection, judgment, and transformation of the world stands as the solemn close of time and entrance on eternity. In the further course of Protestant theology some more mystical thinkers have sought to vivify the abstract monotony of the world beyond the grave as conceived by the church (a) by adopting once more the biblical Chiliasm, now termed Millenarianism, or (b) by finding a compensation for purgatory in assuming the capability of conversion beyond the grave, or assuming a growing perfectibility, or assuming a general restoration of all men (Apocatastasis).

On the contrary the more rational theologians tended rather to set aside the last remains of the primitive Christian dogmas—Parousia and Resurrection, and to reduce this whole section of doctrine to the Alexandrine form of the incorporeal continuance of souls. Philosophic thinkers found the essential idea of Christian cschatology in the immanent eternity or infinity of the religious spirit; along with which the individual continuance of souls was denied by some (as in Schleiermacher's by the Hegelian Left), but asserted by others (as by Leilmitz, Wolff, Kant, Fichte, Schelling, the Hegelian Right, Krause, Herbart, Lotze, Teichten

müller, &c.).

Theology holds almost exclusively to the latter de. The Christian faith has from the beginning combined the two fundamental forms of hope for combined the two mindamental forms or nope for the future: (a) the Hebrew, of hope for the carthly future perfection of the people of God, and (b) the Hellenistic, directed to the supra-mundane perfec-tion of the individual soul. Each of the two represents an essential side of the Christian hope, and is conceivable without self-contradiction; it is only from the mixture of both sides, as it passed over from the Jewish theology into primitive Christianity, that obscurities and contradictions

To set aside these and bring each of the arose. two sides, the mundane and the supramundane, or the social and individual, hope of perfection to the clearest possible view appears to be the eschatological task of the theology of the present.

The primitive Christian faith in the return of

634

Christ and the earthly erection of his kingdom includes the ideal of the earthly realisation of the kingdom of God, or of the extensive and intensive permeation of the Christian spirit throughout permeation of the Christian spirit throughout humanity, as the goal and task of the history of the world. It is in the union of all mankind in the family of the children of God and in the moralising of the whole life of society through the power of the Christian spirit that the victorian spirit than the victorian spirit that the victorian spirit the victorian s ous Coming and Royal Rule of Christ in the earthly world is constantly realising itself. But, because realising itself upon the foundation of the historical life of nations, it remains constantly bound to those conditions and limits which are historically human.

Christian faith hopes to find in the supramundane or heavenly future of the individual persons the completion of what is on earth but frag-mentary, and the harmony of what is on earth discordant. This bope rests partly (a) on the consciousness of the independent super-sonsmons reality of the personal life distinct from its sensuous organism; partly and especially (b) on the conviction of our faith that we are destined to perfect likeness to God and fellowship with God, and that this our destination is eternally founded in God, and therefore not to be set aside by any

temporal contingency whatover.

Since the capacity for development which is inherent in the nature of the human soul cannot be removed with the death of the body, and since the eternity of the pains of hell may be considered neither psychologically thinkable nor consistent with the all-wise love of God, nor yet correspondent to the thought of I Cor. xv. 28, therefore the Protestant doctrine of the stability of the twofold state of departed souls must be transformed into the thought of an infinite variety of forms and stages of development beyond the grave in which there remains from for the infinite love to exercise endlessly its educative wisdom. Further, the unbiblied conception of a resurrection of the body of flesh is to be explained according to the spiritualised (1 Cor. xv. 44, also 50th verso) Pauline theory of resurrection bodies, in doing which the speculative theory of the body as the totality of ministering forces organised by the soul itself may be called to our aid.

For the rest, the true evangelical treatment of the 'last things' must follow the principle of biblical cantion; and, instead of arbitrarily pictur-ing to ourselves that which is unsearchable, we can content oursolves with the promise that we will be present with the Lord, and that the eternal blessed life, which is begun indeed already here below, but, under the endless suffering of the world, remains constantly incomplete, will at last reach perfection in the knowledge and lave of God.

See the articles Conditional Immortality, Devil, See the articles Conditional Immortality, Devil, Heaven, Immerality, Prayers for the Dead, Purgatory, Resurenceton; also the Histories of Degma of Neander and Hagenbach; E. Whito's Life in Christ (1846); Andrew Jukos's Lestitution of All Things (2d ed. 1869); J. Baldwin Brown's Doctrine of Annihilation in the Light of the Gospel of Love (1875); F. N. Oxenham's Catholic Eschatology and Universalism (2d ed. 1878), and his answer to Puscy, What is the Truth as to Everlasting Punishment? (2 parts, 1882); H. M. Luckock's After Death (1879); W. R. Algor's Critical History of the Doctrine of a Future Life (10th ed., with a complete bibliography of the subject, comprising 4977 books relating to the Nature, Origin, and Destiny of the Soul, by Ezra Abbot, Boston, 1880); E. H. Plumptre's article 'Eschatology' in Smith

and Wace's Dictionary of Christian Biography, &c. (vol. ii. 1880), and his Spirits in Prison, and other Studies on the Life after Death (1885); F. W. Farrar's Elernal Hope (1878), and Mercy and Judyment (1881); S. Davidson's Doctrine of Last Things contained in the New Testament (1882); Th. Kliefoth's Christl. Eschatologic (Leip. 1886); and Professor J. Agai Beet's series of papers in the Expositor for 1890.

Hellas. See Greece.

Hellebore, a name applied to two distinct genera of plants. The genus to which it more properly belongs, and to which it has belonged since vory ancient times, Helleborns, is of the natural order Rannnenlacca, and is characterised by a ealyx of five persistent sepals, often resembling petals; a corolla of eight or ten very short. and three to ten pistils; a leathery capsule, and seeds arranged in two rows. The species are per ential herbaceous plants, mostly European, generally with a dear test to the control of ally with a short root-stock; the stem mostly leafloss, or nearly so, but sometimes very leafy; the leaves more or less evergreen, lobed, the flowers terminal. A familiar example of this genus is the Black Hellebore—so called from the colour of its Black Hellebore—so ealled from the colour of its roots—or Christmas Rose (H. niger), a favourite in flower-gardom, because its large white flowers—which have in recent years been greatly improved by florists in point of size and purity of colour—are produced in winter. The leaves are all radical; the stalks generally one-flowered; the flowers white or tinged with red. Black hellebore formerly enjoyed a higher reputation as a medicinal agent than it now possesses. Melampus is represented as employing it in the treatment of madness centuries before the Christian cra. The root is the part used in medicine, and it is imported into



Christmas Rose (Helleborus niger).

Britain from Hamburg, and sometimes from Marsoilles. It consists of two parts—the rhizome or root-stock, and the fibres descending from it. The former is nearly helf an inch thick, several inches long, and knotty, with transverso ridges and slight longitudinal strice. The taste is slight at first, then bitter and acrid. It is not much at first, then bitter and acrid. It is not much employed at the present day, but it has been found of service (1) in manis, melanchelia, and epilepsy; (2) as an enumenagogue; (3) in dropsy—its action as a drastic purgative, and its stimulating offect on the vessels of the liver, rendering it restricted. it useful; (4) in chronic skin diseases; and (5) as an antholmintic. Ten or fifteen grains of the powdered root act as a sharp purgative. The

tincture, which is obtained by maceration in spirit, is usually given when its action as an enumenagogue is required. In an excessive dose it acts as a nurcotic acrid poison, and canses vomiting, purging, burning pain in the stomach and intestines, faintness, paralysis, and death.—Stinking Helle-bore (H. fætidus) grows on hills and mountains in the south and west of Europe, in some of the chalk districts of England, and in several places in Scotland. It has a very disagreeable smell, and green flowers somewhat tinged with purple. The stem is many-flowered and leafy.—Green Hellebore (H. vividis), also found in the chalk districts of England, has a leafy stein, with a few large greenish-yellow flowers. The celebrated hellehore of the ancients was probably a species peculiar to Greece and the Levant, H. orientalis or H. officinalis; all the species, however, have similar medicinal qualities. From the abundance of the plant around the city of Anticyra, hypochondriacal persons were said to need a visit to Anticyra.

White Hellebore (Veratrum album) belongs to the natural order Melanthacere. The genns has polygamous flowers, with six-leaved perlanth, six staniens, three pistils cohering at the base, a threehorned capsule separating into three many-secoed normed capsule separating into three many-sected follicles, and compressed seeds winged at the apex. White hellebore has a leafy stem, sometimes 4 feet high, ovate-oblong leaves, a long terminal compound panicle, and yellowish-white flowers. It abounds in the mountains of the centre and south of Europe, but is not found in Britain. The root was once much used in medicine, but now rarely, although it seems to act powerfully in some diseases. It is a very acrid and active poison. Its powder is used to destroy lice, and by gardeners for killing caterpillars. A decoction and ointment of it are sometimes used in itch and ringworm. Caution is necessary even in handling the powder of white hellebore, and very unpleasant effects ensue from its getting into the eyes or mose.

—American Hellebore, or Swamp Hellebore (V. rivide), known also as Indian Poke or Itch Weed, is frequent in damp grounds from Canada to Caralina. Its root has appropries similar to Caralina. to Carolina. Its root has properties similar to those of white hellebore. These properties seem to depend chiefly on an alkaloid called Veratria

Hellenist (Gr. Hellenistes), one who adopts Greek customs and language; a name given especially to those among the Jews, and afterwards in the Christian church of Judca, who, either by hirth or by residence, and by the adoption of the Greek language, manners, and usages, were regarded as Greeks—in opposition to the Hebrews properly so called, whether of Palestine or of the Dispersion, and to the Hellenes, or Greeks proper. They are ealled Grecians in the Authorised Version, Grecian Jews in the Revised Version, of the New Testament. They inevitably stood in a relation of singlest features. rivalry, if not of antagonism to the Hebrews (see Acts, vi. 1, and ix. 29). It was among the Jews settled in Alexandria that the Hellenising tendency found its freest development; and it is to that city that we must refer the formation as well of that peculiar dialect of the Greek lan-guage which is known as the Hellenistic, as of that speculative philosophy which exercised so large an influence on those early Christian schools, of which Origen is the most famous exponent (see Alexandria).

The really characteristic element of the Hellenistic Greek consists in its foreign, and especially its Hebrew and Aramaic words and idioms. Although it was in its origin a purely popular form of the language, yet its being employed in the Alexandrian or Septuagint version of the Old Testament has given to it all the fixedness and definite character

of a written language. The Hellenisms of the Septuagint differ in many respects from those of the New Testament, which again present some points of discrepancy with those of the Alexandrian Fathers; but there are certain leading characteristics common to them all.

The influence of the Hellenistic modes of thought on the Alexandrian philosophy will be traced under

PHILO, NEOPLATONISM, PLOTINUS, &c.

Philo, Neoplatonism, Plotinus, &c.

See Winer, Grammatik des N. T. Sprachidioms (1822; 7th ed. 1867); Alex. Buttmann, Gramm. des N. T. Sprachgebrauchs (1859); S. A. Green, Handbook to the Grammar of the Greek New Testament (1883); W. H. Sincox, Oa the Language of the New Testament (1880); Dr Hatch, Essays in Biblicol Greek (1889). There are dictionaries of New Testament Greek by Schleusner (1792), Robinson (Boston, 1836; New York, 1850), Cremer (1866; Eng. ed. by Urwick), D. Harting (2d ed. Utrecht, 1888); also Grimm's ed. of Wilke's Clavis (1868, and 1877-79; Eng ed. by Professor Thayer). Concordances of the Greek New Testament are those by R. Young (1884), and Hastings and Hudson, as revised by E. Abbot (Boston, 1885).

Heller. Stephen. pianist, and musical con-

Heller, Stephen, pianist and musical composer, was born on 15th May 1814 at Pesth, and made a brilliant debut as a pianist when only nine years of age. Before he was sixteen he had played in most of the principal cities of Europe. From 1830, when he settled in Augsburg, he began to study composition. In 1838 he removed to Paris, where he occupied himself with composing and teaching until his death, on 14th January 1888. In the matter of technique he must be ranked beside Chopin. He wrote almost exclusively for the pianoforte; his works, which number about 150, consist of sonatas, ctudes, &c., and are distinguished by originality and refinement. See his Life by Barbelette (Paris, 1876).

Hellespont, See DARDANELLES.

Hell Gate, or HURL GATE, named by the Dutch settlers of New York Helle Gut, is a pass in the East River, between New York city and Long Island, formerly very dangerous to vessels from its numerons rocks and rapid current. As early as 1851 attempts were made to blast away the obstructions; the operations which in 1885 finally freed the navigation are described, with an illustration, in the article BLASTING.

Hellin, a town of Spain, 69 miles by rail NNW. of Murcia. In the vicinity are productive sulphurmines and sulphur-springs. Pop. 13,700.

Helm. See STEERING.

Helmet. See Armour, Heraldry.

Helmet-shell (*Cassis*), a genus of gasteropods, type of a family (*Cassidæ*), the members of which are somewhat whelk-like, and have thick, heavy shells, with bold ridges, a short spire and a long aperture, the outer lip toothed, the canal reenrved. Numerous species, amounting to about lifty if we include closely allied genera such as Cassidaria, occur in the warner seas. As the shells are made up of differently-coloured layers, they are much used for the manufacture of Cameos (q.v.). The species most used is the large Black Helmet (C. madagascarensis), sometimes almost a foot long, with a whitish onter and black inner layer.

Helmholtz, Hermann von, a very distinguished scientist, was born at Potsdam, 31st August 1821; he was ennobled by the Emperor of Germany in 1883. He was at first a surgeon or Germany in 1883. He was at first a Sugern in the army, then assistant in the Berlin Anatomical Museum, and was a professor of Physiology from 1849 at Königsberg, from 1855 at Bonn, and from 1858 at Heidelberg. In 1871 he became professor of Physics in Berlin. Helmholtz is equally distinguished in physiology, in mathematics, and in experimental and mathematical physics. His physiological works are principally connected with the cye, the ear, and the nervous system. Thus, we have his exhaustive treatise on Physiological Optics, his Speculum for the examination of the Retina, his Discourse on Human Vision, and various papers on the means of measuring small periods of time, and their application to find the rate of propagation of nervedisturbances. Of a semi-physical nature we have his Analysis of the Spectrum, his explanation of Vowel Sounds (Klangfurbe der Vocalen; see Sound), and his papers on the Conservation of Energy with reference to Muscalar Action. In physical science he is known by his paper on Conservation of Energy (Ueber d. Erhaltung d. Kraft, 1847, translated [badly] in Taylor's Scientific Memoirs, new series); hy a popular lecture on the same subject (1854); by two memoirs in Crelle's Journal, on Vortex-motion in fluids, and on the Vibrations of Air in open pipes, &c., and by several researches into the development of electric current within a galvanic battery. His Poputüre vissenschaftliche Vortrage appeared in 1865-76 (Eng. trans. by Atkinson, with Introduction by Tyndall, 1881); his great work on Die Lehre der Tonempfindungen (Eng. trans. by Alex. J. Ellis, The Sensations of Tone) in 1862; and his H'issenschaftliche Abhandlungen in 1881-83. See the sketch by Clerk-Maxwell in Nature, vol. xv.

Helminthology (Gr. helmins, 'a worm,' and logos, 'a discourse'), that branch of natural history which treats of 'worms,' or more particularly of the parasitic forms.

Helmond, a town in the Netherlands, province of North Brahant, lies 23 miles NW. of Venlo by rail. The principal industries are the manufacture of textiles, of cigars and tobacco, dyeing, and printing. Pop. 7772.

Helmont, Jean Baptiste van, Belgian chemist, was born at Brussels in 1577. At Louvain he studied medicine and its cognate sciences, but soon turned aside from them to throw himself into the movement known as mysticism, to study the works and practise the precepts of Thomas à Kenpis and Johann Tanler. Then, falling in with the writings of Paracelsus, he came back to his first love, and began to study chemistry and natural philosophy. After spending several years in France, Switzerland, and England, in 1605 he returned to Amsterdam, married Margaret van Ranst, a noble lady of Brahant, and in 1609 settled down at his estate near Vilvorde, where he spent the romainder of his life in chemical investigations of various kinds. He died 30th December 1644. In spite of much theosophical mistiness and much alchemical error, Van Helmont is regarded by some historians of chemistry as the greatest chemist who preceded Lavoisier. He was the first to point out the imperative necessity for employing the balance in chemistry, and by its means showed, in many instances, the indestructibility of matter in chemical changes. He paid much attention to the study of gases, and is supposed to have been the first to apply the term gases to elastic aeriform fluids. Of these gases he distinguished several kinds. He was also the first to take the melting-point of ice and the holling-point of water as standards for the measurement of temperature. It is in his works that the term saturation is first employed, to signify the combination of an acid with a base; and he was one of the carliest investigators of the chemistry of the fluids of the human body. Along with other physical gists of his day, he speculated unch on the seat of the soul, which he placed in the shomach. An account of his contributions to the knowledge of chemistry will be found in the Histories of

Chemistry by Kopp and Höfer. His works, entitled Ortus Medicina, were published by his son four years after his death, and frequently since then. See Rommelaere, Études sur Van Helmont (Brussels, 1868).

Helmstedt, a town of Germany, 24 miles by rail ESE. of Brunswick, was formerly famous for its Protestant university, founded by Julius, Duke of Brunswick, in 1674, and suppressed by Jerome Bonaparte in 1809. The university building (the Juleum), which still remains, the 12th-century church of St Stephen, and the Marienberg church are the most noteworthy edifices. Helmstedt grew up originally round the monastery (now in ruins) of St Ladger in the 9th century. Pop. 9800.

Helmund, or Helmand, a river of Afghanistan, rises on the south slopes of the Hindu Kush, llows south-west, west, and north-west, and after a course of about 680 miles empties itself into the lake of Hamm or Seistan. See map at Afghanistan.

Helobia, or Marsh Lilles, form one of the chief groups of Monocotyledons, and comprise the four orders Butomacea, Alismacea, Juncaginea, and Hydrocharidea.

Heloderm. See GILA MONSTER,

Héloïse. See Abelard.

Melots were the lowest of the four classes into which the population of ancient Sparta was divided. They are generally supposed to have been the aboriginal population of the country, and to have been reduced to bondage by their Dorian conquerors, their mumbers being swelled from time to time by the addition of peoples conquered in war. They belonged to the state, which alone had the power to set them at liberty; but they toiled for individual propriotors, and were bound to the soil—i.e. they could not be sold away from the place of their labour. They were the tillers of the land, for which they paid a rent to their masters; they served at the public meals, and were occupied on the public works. In war they fought as light troops, each freeborn Spartan (who bore heavy armour) being accompanied to battle by a number of them, sometimes as many as seven. On rare occasions they were equipped as heavy-armed soldiers. It is a matter of doubt whether after emancipation they could over enjoy all the privileges of Spartan citizenship. They were treated with much severity by their masters, especially in the later ages of Sparta, and were subjected to degradation and indignities. They were whipped every year, to keep them in mind of their servile state; they were obliged to wear a distinctive dress (clothes of sheepskin and a cap of dog's-skin), and to intoxicate themselves as a warning to the Spartan youth; and when they multiplied to an alaming extent, they were often massacred with the most barbarous ernelty. On one occasion 2000 of them, who had behaved bravely in war, were encouraged to come forward for anancipation, and were then treacherously put to death. The Spartans organised, as often as necessity required, secret service companies (Gr. crypteia) of young men, who went abroad over the country armed with daggers, and both by night and day assassinated the Helots, selecting as their special victims the strongest and most vigorous of the race.

Helps, Sir Arthur, essayist and historian, was born at Streatham, Surrey, 10th July 1813. From Eton he passed to Trinity College, Cambridge, where he was thirty-first wrangler in 1835; but, what meant more, was admitted a member of the famous Society of the Apostles, among whem were Charles Buller, Maurice, Trench, Monckton Milnes, and Tennyson. On leaving the university he

became private secretary to Spring-Rice, then Chancellor of the Exchequer, and next to Lord Morpeth, the Irish secretary. On the fall of the Melbourne ministry he retired to enjoy twenty years of lettered leisure. In 1860 he was appointed Clerk to the Privy-conneil, and was in consequence much thrown into contact with the Queen, who, it is understood, set a high value upon his character and talents. He was employed to edit the Principal Speckes and Addresses of the late Prince Consort (1862), and the Queen's own Leares from a Journal of Our Life in the Highlands (1868). He received the degree of D.C.L. from Oxford in 1864, was made C.B. in 1871, and K.C.B. in 1872. He died in London, after a few days' illness, 7th March 1875.

His first work was a series of aphorisms entitled Thoughts in the Cloister and the Crowd, published as early as 1835. The next, a, work of more real consequence, was Essays written in the Intervals of Business (1841). Two worthless plays followed, then The Chains of Lubon (1844), and Friends in Council (two series, 1847-59), an admirable series of disensions on social questions, thrown into a conversational form. The same familiar speakers (Milverton, Ellesmere, and Dunsford) reappeared in Realmah (1869), Conversations on War and General Culture (1871), and Talk about Aulmals and their Masters (1873). His strong interest in the question of slavery prompted his Conquerrs of the New World and their Bondsmen (1848-52), and the greater work, The Spanish Conquest in America (4 vols. 1855-61). Out of his studies for this work grew his admirable biographies of Lus Casas (1868), Columbus (1869), Pizarro (1869), and Cortes (1871). Other works are Companions of my Solitude (1850), Casimir Maramma (1870), Brevia (1871), Thoughts upon Government (1872), Life and Labours of Thomas Brassey (1872), and Social Pressure (1875).

Helps is one of the most suggestive and delight-

Helps is one of the most suggestive and delightful of our later essayists, revealing everywhere acuteness, human, a satire which gives no pain, and a quiet depth of moral feeling and sense of man's social responsibilities; while his style possesses in a rare degree the qualities of grace, clearness, and distinction.

Helsingborg, an ancient seapart of southern Sweden, 32 miles NW. of Malmö, on the Sound, opposite Elsinore (Dan. Helsingör). It is connected by branch-lines with the railway from Stockholm to Malnö. There are a good harbour, some fishing, and some trade (6500 vessels annually in and out). It figures several times in the wars between Sweden and Denmark. Pop. (1875) 9471; (1888) 17,465.

Helsingfors, a fortified seaport, capital of the grand-duchy of Finland, and after Cronstadt the most important naval station on the Baltic, is beautifully situated on a peninsula, surrounded by islands and rocky cliffs, in the Gulf of Finland, 191 miles W. from St Petersburg by sea and 256 by rail. A series of formidable batteries, called the fortifications of Svehborg, and consisting of seven strongly-fortified islands and munerous islets belonging to Russia, protect the entrance to the harbour, and are of such strength, and so well appointed, as to warrant the application to them of the name of the Northern Gibraltar. The whole front presented by the successive works is more than a mile in length, and, besides the casemates for small-arms, the united fortresses mount about 300 gms or mortars, and are garrisoned by 12,000 men in war-time, there being only about 2000 men in time of peace. The harbour itself is further defended by two forts, Helsingfors is the largest and handsomest town of Finland; the broad streets intersect at right angles,

and there are several fine parks and public squares. Of the public buildings the most striking are the house in which the diet meets, the senate-house, and the university buildings. There are also three very handsome churches. The university, removed hither from Abo in 1828, where it had been founded in 1640, comprises four faculties, and in 1838 had 45 professors, and 1703 students inscribed on the lists, of whom 12 were ladies, but of whom only 1002 were actually in residence. In connection with it are a library of 200,000 volumes, a hospital, a botanic garden, and a valuable observatory. Helsingfors is a favourite bathing-place, and attracts many visitous during summer from St Petersburg. The town carries on a considerable trade in Baltic produce; it exports chiefly timber, paper, and butter, and imports iron and steel goods, with machinery, fancy articles, colonial wares, &c. Pop. (1870) 32,113; (1889) 64,817, including the garrison.

Helsingfors was founded by Custavus I, of Sweden in the 16th century, but the site of the

Helsingfors was founded by Chistavas I, of Sweden in the 16th century, but the site of the town was removed nearer the shoro in 1639. In 1819 it became the capital of Finland. In August 1855, during the Crimean war, Sveåborg was hombarded for two days and nights by a section of the allied fleet, without any material impression being made upon the forts. Helsingfors has still many Swedish characteristics, the majority of the population being of Scandinavian origin, hence Swedish is the tongue generally spoken. The Fimish language, however, is beginning to assert itself.

Helst, Bartholomeus van der, a Dutch painter, was born (according to tradition) at Haarlen in 1613. He was joint-founder in 1654 of the painters' guild of St Luke at Amsterdam, where he lived, and where he died in 1670. He attained great celebrity as a portrait-painter. Some of his pictures seem to bear traces of Franz Hals's influence. One of his works at Amsterdam, a 'Muster of the Burgher Guard,' with thirty full-length figures, was pronounced by Sir Joshua Reynolds to be 'the first picture of portraits in the world.' His later creations are inferior in merit to the pieces painted before 1650. Numerous paintings by him exist in European galleries.

Helston, an old market-town and municipal borough of Cornwall, 10 miles WSW. of Falmonth. It was made a borough by King John in 1201; and from the reign of Edward I. to 1832 it sent two members to parliament, and one till 1885. It has long been noted for its Farry or Flora Dance, held on the 8th May. A branch-line from Gwinear Road was opened in 1887. Pop. (1881) 3432.

Helvella, a genus of fungi, of the class Ascomycetes (see Fungi), having the pilcus turned downwards, lobed and folded, and the surface of the hymenium even. Some of the Helvelle are edible, and much used in Germany.

Helvellyn, one of the highest mountains of Eugland, in the west of Cumberland, between Keswick and Ambleside. It is 3118 feet high, is easy of ascent, and commands magnificent views.

Helvetia, a Swiss colony in the Argentine Republic, in the Gran Chaco, 80 miles N. of Santa Fé. Founded in 1856, it had 2103 inhabitants in 1882.

Helvetic Confessions. See Confessions of Faith.

Helvetii, a Celtie people inhabiting, according to Carar, the region botween the mountains of Jura on the west, the Rhone on the south, and the Rhine on the east and north, the region corresponding pretty closely with the western part of modern Switzerland. Their chief town was Arcaticum, and they were divided into four pagi or cantons, of

which the most important was the pagns Tigarinus. They are first mentioned in the war with the Cimbri, but the chief event in their history is their attempted irruption into and conquest of southern Gaul, in which they were repulsed by Cresar with frightful slanghter, 58 n.c. Fortunately we have the story in the terse but vivid narrative of Cresar They collected three months' provisions, burned down their twelve towns and 400 villages, and made a general tendezvous by Lake Leman in the spring of the year. Cresar hastened to Geneva, destroyed the bridge, raised two legious in Cisalpine Gaul, and when the Helvetians sent delegates to demand a passage, delayed them until he had built a wall along the Rhone, 16 feet high and about 19 Roman miles in length, flanked with redoubts. After vainly attempting to pass this barrier, the Helvetii took another route, but were followed and defeated with terrible slanghter at Bibracte (Autun), and the remnant obliged to return to their own country, where they became subject to the Romans, who overawed all disaffection by the fortresses which they built, Noviadunum, Vindonessa, Amentican. Of 368,000 who left their homes, including 92,000 fighting men, only 110,000 are said to have returned. See Switzerland.

Helvétius, CLAUDE ADRIEN, one of the French Encyclopedists, was of Swiss origin, and was born at Paris in 1715. He was trained for a financial careor, and in 1738 was appointed to the lucrative office of farmer-general. But this post he quickly resigned for the situation of chamberlain to the queen's honsohold. At this time he associated much with the French philosophers of the day, Diderot, D'Alembert, Holbach, and others. In 1751 he withdrew to a small estate at Vore (Le Perche), where he spent the most of his life in the education of his family, the improvement of his peasantry, and in literary labours. In 1758 appeared his colebrated work, De VEspret, in which, carrying out, as he thought, the work of Locke, he endeavoured to prove that sensation is the source of all intellectual activity, and that the grand lever of all intellectual activity, and that the grand lever of all human conduct is self-gradification. The book created an immense sensation. It was denonneed by the parliament of Paris to be publicly burned. Everybody read it, and it was translated into the principal Enropean tongnes. Helvétins died at Paris, 26th December 1771, leaving behind him a work, De Vilomme, de see Faculités, et de son Education (2 vols. Lond. 1772). His collected works were published in 14 vols. at Paris in 1796, and again in 3 vols. in 1818. See Morley's Diderot and the Encyclopacdists (1878).

Helvoetsluys, or Hellevoetsluis, a fortified scaport of South Holland, on the Haring-Vliet, an arm of the Maas, 17 miles SW. of Rotterdam. It has an excellent harbour, and is to Rotterdam and the mouth of the Maas what the Helder is to Amsterdam and the Zuider Zee. There is a school of navigation. Here William III. embarked for England, November 11, 1688. Pop. 4302.

Hemans, Felicia Dorottiea, pootess, was horn at Liverpool, 25th September 1793. Her father, Georgo Browne, was a Liverpool merchant, of Irish extraction; her mother, whose maiden name was Wagner, was of mixed Italian and German descent. Felicia was distinguished for her heauty and precedity, and at an early age she manifested a taste for poetry, in which she was encouraged by her mother. Family reverses led to the removal of the Brownes to Wales, where the young pootess imbibed a strong passion for nature, read books of chronicle and romance, and gained a working knowledge of the German, Italian, Spanish, and Portuguese languages. She also entitivated

her excellent musical taste. Her first volume was published in 1808, when she was only fifteen years of age, and contained a few pieces written about four years carlier; her second, entitled The Domestic Affections, appeared in 1812. In the same year she murried Captain Hemans of the 4th Regiment, whose health had suffered in the retreat on Cornuna, and afterwards in the Walcheren expedition, and who settled in Italy in 1818. After this time they never met again; their marriage was understood not to have been happy. Mrs Hemans, though in poor health, now devoted herself to the education of her children, to reading and writing, and spent the rest of her life in North Wales, Lancashire, and latterly at Dublin, where she died, 16th May 1835. Her principal works are: The Vespers of Palermo, a tragedy (1823), which proved a failure when acted at Covent Garden; The Siege of Valencia, The Last Constantine, and other Poems (1823); The Forest Sanctuary (1827); Records of Women (1828); The Songs of the Affections (1830); and Hymns for Childhood, National Lyries and Songs for Music (1834); and Seenes and Hymns of Life (1834). A volume of Poetical Remains was published after her death, and subsequently a complete edition of her works, with a memoir by her sister, was issued in 7 vols. (1839). During a visit that she paid to Abbotsford, Scott complimented her on her musical talents: 'I should say you had too many gifts, Mrs Hemans, were they not all made to give pleasme to those around you.' And on parting he said: 'Thee are some whom we meet and should like ever after to claim as kith and kin; and you are one of these.'

Mis Hemans, without great originality or force, is yet sweet, natural, and pleasing. But she was too fluent, and wrote much and hastily; her lyries are her best productions; her more ambitions peems, especially her tragedies, being, in fact, quite insipid. Still, she was a woman of true genius, though her range was circumscribed, and some of her little lyries, The Voice of Spring, The Better Land, The Graves of a Household, The Treasures of the Deep, and The Homes of England, are perfect in pathos and sentiment, and will live as long as the English language. These are found in almost every school collection, and this early familiality with her sweet and simple lyries has helped to keep her memory green.

Besides her sister's memoir, there are Memorials by H. F. Chorley (1836); Recollections by Mrs Lawrence (1836); Pactical Remains, with memoir by Delta (1836); and Pactical Works, with memoir by W. M. Rossetti (1873). See also Espinasse's Laucashire Worthies (1874).

Hematite. See HEMATITE.

Hemel Hempstead, a market-town of Hertfordshire, 23 miles NW. of London, a centre of the straw-plaiting industry. It has also paper-mills, iron-foundries, tanneries, and broweries. Pop. of parish (1851) 7073; (1881) 9004.

Hemerocallis. See DAY-LILY.

Hemianopia (Gr. hemi, 'one-half,' an, 'not,' and ops, 'the eye'), vision limited to one-half of an object—a peculiar and rare form of disease, generally due to disease within the brain.

Hemicrania. See MEGRIM.

Hemidesmus. Sec Sarsaparilla.

Hemiplegia (Gr. hemi, 'one-half,' and plēssō, 'I strike'), Paralysis (q.v.) limited to one side of the face and body, and usually depending upon disease of the brain. Opposed in signification to Paraplegia.

Hemipode. Sec QUAIL.

Hemip'tera (Gr., 'half-winged'), a large order of insects, to which the general term 'bngs' is often

applied, or the more modern title Rhynchota, in allnsion to the characteristic suctorial proboscis. The order includes (1) forms with similar wings (Homoptera)—e.g. coccus insects, aphides, Cicadas (q.v.); (2) others with dissimilar wings (Heteroptera)—e.g. water-bugs, water-scorpions; and (3) parasites or Lice (q.v.).

Hemlock (Conium), a genus of plants of the natural order Umbellifere, having compound umbels of small white flowers, small general and partial involueres, the limb of the calve merely radimentary, and a compressed ovate fruit with five prominent wavy ridges and no vittee. The bestknown and only important species is the Common



Flowers and Root of Common Hemlock (Consum maculatum): c, a flower; d, a seed.

or Spotted Hemlock (C. maculatum), which grows by waysides, on heaps of rubbish, and in other similar situations in Britain and on the continent of Europe, in some parts of Asia, and now also as a naturalised plant in North America and in Chili. It has a root somewhat resembling a small passnip; It has a root somewhat resemuling a small parsin; a round, branched, hollow, bright-green stein, 2 to 7 feet high, generally spotted with dark purple; the leaves large, tripinnate, of a dark shining green colour; the leaflets lanecolate, pinnatifid. All parts of the plant are perfectly destitute of hairs, and it is the only British species of the order Umbelliferæ which has the stem smooth and spotted with purple. Both the general and partial umbels have many rays. The general involucres consist of several small leaflets, the partial involucres of three small leaflets, all on one side. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves and fruit are the parts of the plant employed in medicine. The former or bruised. The leaves and fruit are the parts of the plant employed in medicine. The former should be gathered just before the time or at the commencement of flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. They should then be preserved in perfectly closed tin canisters. The fruit is gathered when fully developed, but still green, and should be carefully dried.

The most important ingredient in hemlock is the alkaloid conine, a volatile, colourless, oily, strongly alkaline substance, C₈H₁₇N, but it also contains two other alkaloids—methylconine and conhydrine. The fruit contains about one-fifth per cent. of it, the other parts of the plant merely traces. It is obtained by distilling the seeds with water which contains a little potash in

seeds with water which contains a little potash in solution; the conine passes over with the water in stitle form of a yellowish oil, and is purified by redistillation. Conine has lately been prepared artificially by Schiff. Conhydrine, C₈H₁₇NO, is a solid volatile alkaloid, and is much less poisonous than conine.

Conine and methylconine are extremely poisonous, and cause death by their action on the nervous system. The action of contum depends of course on the combined effects of the active principles contained in the plant. The symptoms of commun poisoning are weakness and staggering gait, passing on to paralysis, which gradually passes up the cord until it leaches the respiratory centre, when death ensues. Dilatation of the pupil, ptosis, and asphyxial convulsions are symptoms also seen.

In medicine, it is given internally as a sedative to the nervous system in chorca, incontinence of urine, paralysis agitans, and other affections, is also employed as a vapour to relieve cough, may be administered internally in the form of powder (of the leaves), succus, tineture, or extract, while externally it may be applied as a soothing application to ulcer-, painful piles, &c., in the form of ointment or poultice. The succus is considered the best preparation, the others often containing

no active principle.

In cases of poisoning by hemlock, the evacuation of the stemach is the first thing to be attended to. of the stemach is the first thing to be attended to. Among the ancient Greeks, posoning by hemlock was a common mode of death for condemned eniminals, and thus it was that Socrates died.—Water Hemlock, or Cowbane (Cicūta rirosa), is also an umbelliferous plant, of a genus having nuch-vaulted umbels, a five-toothed calvx, and almost globose fruit, each caupel with live broad flattened ribs and evident single vittee. Water flattened ribs and evident single vitte. Water hemlock grows in ditches, on the margins of ponds, and wet grounds in Europe and the north of Asia. It is more common in Scotland than in England, It has a large fleshy white root, covered externally with files; an erect much-branched stem, 2 to δ feet high; tripinnate leaves, with linear-lanecolate regularly and sharply senated leaflets; no general involuere, or only a single small leaflet, partial



Water Hemlock (Cicuta virosa).

involueres of many short narrow leaflets; and white flowers. It contains an active principle, Cicut-ozine, and an essential oil. It causes tetanic spasins, insensibility, voniting, and diarrhea.
Fatal results have occurred from eating the root. Another species, C. maculata, is common in North America, growing in marshy places. It has a spotted stem, like that of true hemlock, the name of which it very generally receives in North America. The leaves are triternate, the leaflets ternate. It is a very poisonous plant, and is the cause of many deaths.—The Cicuta of the Romans was the Conium of modern botanists (Gr. koneion), as water hemlock does not grow in Italy or Greece.

The ornamental plant, the so-called Giant Hemlock, which in good rich soil reaches a height of 12 to 15 feet in three months, is not really a hemlock at all, but a giant Cow-parsnip (q.v.).

Hemlock Spruce. See Fir. Hemorrhage. See Bleeding.

Hemp (Cunnabis), a genus of plants of the natural order Cannabinaceae (q.v.), having the male and female flowers on different plants; the male flowers with five-partite calyx and live stamens; the female flowers with a spathe-like calyx of one lenf, rolled round the ovary and partially split along one side, and two threadlike stigmas. There is only one known species (C. sativa), varying considerably, bowever, from soil, climate, and cultivation. It is an annual plant, a native of the warmer parts of Asia, but has been enlitvated in Europe from the reaching the was need entire and is now naturalised in many parts of Europe and America. Like flax, it adapts itself wonderfully to diversities of climate, and is entired equally under the burning sun of the tropies and in the northern parts of Russia.



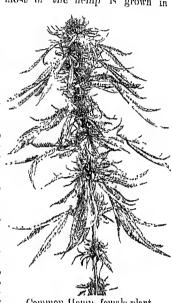
Common Hemp (Cannabis satira), male plant.

It is, however, readily injured by frost, particularly when young; and in many countries where it is cultivated it succeeds only because the warmth of the summer, though of short duration, is suffi-cient for its whole life. Hemp varies very much in height, according to the soil and climate, being sometimes only 3 or 4 feet, and sometimes 15 or 20 feet, or even more. Notwithstanding the coarseness of its leaves, it is an elegant plant, and is sometimes sown on this account in shrubberies and large flower borders. The stem is creet, more or less branched; the leaves are five to note fingered. The flowers are yellowish-green, small, and minerous; the male llowers in axillary raceines on the upper parts of the plant; the female flowers in short axillary and rather crowded spikes. The female axing and rather crowded spixes. The temate plants are higher and stronger than the male. The stem of hemp is hollow, or only filled with a soft pith. This pith is surrounded by a tender, brittle substance, consisting chiefly of collular tissue, with some woody fibre, which is called the reed, boon, or shove of hemp. Over this is the thin reed, boon, or shove of hemp. Over this is the thin bark, composed chiefly of fibres extending in a parallel direction along the stalk, with an onter inembrane or cuticle.

Hemp is cultivated for its fibre in almost all countries of Enrope, and in many other temperate parts of the world, most extensively in Peland,

and in the centre and south of European Russia. which are the chief hemp-exporting countries. French hemp is much esteemed in the market, as is also that of England and Ireland, of which, however, the quantity is comparatively inconsiderable. ever, the quantity is comparatively inconsiderable. Bolognese Hemp and Ithenish Hemp are varieties remarkable for their height; and a fibre of very fine quality, 8 or 9 feet long, is known in commerce by the name of Italian Garden Hemp. In the United States most of the hemp is grown in

Kentneky. ln the England enlitivation hemp is almost confined to Lincolushire, Hold-erness in Yorkshire, and a few other districts, of which the moist alluvial soil is particularly suited to 'In cultivating hemp it is very necessary to have the soil so rich, and to sow the seed at such a season, that the plants shall grow rapidly at first, as they thus formlong fibres. A erop of short scrubby hemp is almost worth-less. The finer



Common Hemp, female plant.

kinds of hemp are used for making cloth, the coarser for saileloth and ropes. Hemp sown thin produces a coarser libre than hemp sown thin produces a coarser libre than hemp sown thick. Something also depends on the time of pulling, for the crop is pulled by the hand. When a rather fine fibre is wanted, and the seed is not regarded, the whole crop is pulled at once, soon after llowering; otherwise in the control of the crop is pulled at once, soon after llowering; otherwise in the control of the wise, it is usual to pull the male plants as soon as they have shed their pollen, and to leave the female plants to ripen their seed, in which case the fibre of the female plants is much courser. The treatment of hemp by retting, &e. is similar to that of Flax (q.v.). The fibre of hemp is generally used for coarser purposes than that of flax, particularly for satisfath, pack-sheet, ropes, and the caulking of ships.

The seed of hemp is produced in great abund-It is commonly sold as food for cage-birds; and hirds are so fould of it that not only the ipening fields, but the newly-sown fields, must be carefully guarded against their depredations. A fixed oil, oil of hempseed, is obtained from it by expression, which is at first greenish yellow and afterwards yellow, and has an aerid odour, but a mild taste. This oil is used in Russia for burning in lamps,

although the wick is apt to get clogged, also for making paints, varnish, and a kind of soft soap.

Hemp is cultivated in warm countries not so much for its fibre as for a resinous secretion, which has narcotic or intoxicating qualities (see HASHISH). Homp is also used as a therapentic agent under the mane of Indian Hemp, or Bhang, and may be administered in the form of resinous and may be administered in the form of resinous and may be administered in the form of resinous extract or of tinethre; and it is usually prescribed (like opium) for its hypnotic, anodyne, and antispasmodic properties. Although less certain in its action than opium, it possesses these advantages over that drug—that it does not constipate the bowels, create nansca, or check the secretions, and

that it is less likely to occasion headache.

The name Hemp (Ger. Hunf) is from the Greek and Latin cannahas, and that from Sanskrit cana. The name hemp is often extended with some distinctive melix to many of the fibres used for ropes and coase fabrics—Sunn Hemp, Manilla Hemp, Deccan Hemp, Sisal Hemp, &c. See Apolynace E, Bowstring Hemp, Fibrous Substances.

Hemp Palm (Chamærops cæcelsa; see Cha-MEROPS), a palm of China and Japan, the fibre of the leaves of which is much employed in those countries for making cordage. Hats are also made of its leaves, and even cloaks and other garments for wet weather.

Hems, Homs, or Huns (Lat. Emeso), a city of Syria, is situated near the right bank of the Orontes, 63 miles NE. of Tripoli. It is surrounded by ancient walls, now greatly mined, and is entered by ancient walls, now greatly mined, and is entered by six gates. Its streets are narrow and dity, and its houses mean. In ancient times it was chiefly celebrated for its temple of the Sun, now destroyed, though probably its site is occupied by the dilapidated castle or fortress, ruined by Ibrahim Pasha in 1831. One of the priests of this temple, Heliogabalus, was raised to the imperial throne of Rome in 218. Under the walls of Hems (Emesa) Zenobia was defeated by the Emperor Aurelian in 272. In 636 the city was taken by the Saraceus, when its old Semitic name Hems was revived; and in 1098 it fell into the hands of the Crusaders. It has a considerable trade in oil, cotton, and seame, and produces, besides in oil, cotton, and seame, and produces, besides these commodities, silk goods and gold wares. Pop. about 20,000,

Hemsterhuis, TIBERIUS, Dutch philologist, was born at Groningen, 1st February 1685. He became professor of Greek at Francker in 1720, and of Greek history at Leyden in 1740, where he died 7th April 1766. One of the greatest Greek scholars of Greek history at Leyden in 1740, where he died 7th April 1766. One of the greatest Greek scholars of his time, Hemsterlans may be said to have created a new school of Greek philology, to which belong his distinguished pupils Rulinken and Valckenaer. His editions of the Onomasticon of Pollux (1706), of the Select Dialogues of Lucian (1708 and 1732), and of the Plutus of Aristophanes (1744, by Schafer 1811) are his principal literary works. A beautiful picture of his life is given in Rulinken's Elogium Hemsterhusii (1768 and 1789), republished in Lindemann's Vite duumvironum T. Hemsterhusii et D. Ruhnkenii (Leip. 1822). From Hemsterhusii et D. Ruhnkenii (Leip. 1822). From Hemsterhuis's MSS. Ancedota Hemsterhusiana (1825) have been edited by Geel, and Orationes et Epistolæ (1839) by Friedemann.

Hen. Sec Poultry.

Henbane (Hyoscyamus), a genus of plants of the natural order Solanacere, having a five-toothed the natural order Solanacere, having a live-toothed calyx, an irregular, funnel-shaped corolla, and a capsule opening by a lid and enclosed in the hardened calyx. The species are mostly annual and biennial herbaceons plants, and natives of the countries near the Meditenanean Sea. The only species found in Britain is the Common Hendrick of the countries which is the Common Hendrick of the countries and the countries are searched. bane (*H. niger*), which is not uncommon in waste places and in the neighbourhood of towns and villages, particularly in calcareous soils, and on the sandy shores of Scotland. It is an annual plant, somewhat bushy, about 2 feet high, with large sinnated or sharply-lobed leaves without leaf-stalks, and large dingy yellow flowers with purplish veins. The whole plant is covered with unctuous hairs, and has a nauseons smell, which gives waying of its strong properties with congives warning of its strong narcotic poisonous quality. Cases of poisoning by henbane are, however, not rare, but are more frequently owing to the proceedings of quacks than to any mistake of the plant for an esculent.

The seeds contain in largest quantity the peculiar alkaloid on which the properties of the plant chiefly depend, Hyoseyamia or Hyoseyamin, which crystallises in stellated acienlar crystals of a silky lustic.



Henbane (Hyoscyamus niger),

The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine henbane is employed both externally and internally. The leaves are the part commonly used; they are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts allected with neuralgia, &c., and are often found to afford relief. An extract of henbane is sometimes employed instead of belladonna to dilate the pupil of the eye. Tinctime and extract of hombane are often administered time and extract of heribane are often administered in cases of annoying cough, spasmodic asthma, and other diseases requiring sedatives and antispasmodics. Heribane is also employed to calm mental irritation and to induce sleep. For many cases it has one great advantage over landamum, in not producing constipation. The smoke from the burning seeds of heribane is sometimes introduced into a carriers touch to relieve times introduced into a carious tooth to relieve toothache.

The other species of henbanc possess similar properties. The dried stalks of *H. albus* are used by smoking in Greece to allay toothache.

Henderson, capital of Henderson county, Kentucky, on the Ohio, 10 miles S. of Evansville by rail, with nearly a score of tobacco-factories and warehouses, and a number of mills. Pop. 5365.

Henderson, ALEXANDER, a famous Scottish ecclesiastie, born in 1583, and educated at St Andrews, where in 1610 he was placed in the chair of Rhetoric and Philosophy, being soon after presented by Archbishop Gladstanes to the living of Leuchars, in Fife. Although the nominee of a prelate, he soon embraced the popular cause, and became one of its foremost leaders. He is supposed to have had a great share in drawing supposed to have had a great share in drawing up the National Coronant; he withstood to the face the lukewarm theologians of Aberdeen, and at the memorable General Assembly at Glasgow in November 1638, which in the face of the king's commissioner restored all its liberties to the Kirk of Scotland. In all the torthous negotiations with the king Henderson took a principal part, and had many interviews with him. He was moderator at Edinburgh in 1641, and again in August 1643, and drafted the famous Solemn League and Covenant,

which was soon adopted also by the English parliament. Henderson was one of the Scattish commissioners that sat in the Assembly of Divines at Westminster, and in its work spent his last three years in England. He died at Edinburgh, 19th Angust 1646, and was huried in Greyfriaus' Churchyard. See the Lives by Aiton (1836) and M'Crie (1846), and Baillie's Lellers and Journals.

Hendricks, Thomas Andrews, vice-president of the United States, was bern in Ohio, 7th September 1819, and admitted to the Indiana bar in 1843. He served one term in the state legislature, sat in congress from 1851 to 1855, and in the United States senate from 1863 to 1869, and in 1872 was elected governer of Indiana. In 1876 he was the Democratic candidate for the vice-presidency, but was not returned (see Haves, R. B.); in 1884 he was renominated, and, along with Cleveland, elected. He died in Indianapolis, 25th November 1885.

Hengist (A.S. 'stallion') and Horsa, the names of the two brothers who led the first band of Teutonic invaders to Britain. They are mentioned by Nennins and the Anglo-Sacon Chronicle, so that we need not insist upon the suspicious etymologies of the names so far as to dismiss their story as a myth. Accarding to the story they came about the year 440 to help King Vortigern against the Piets, and were rewarded for their services with a gift of the Isle of Thanet. Saan after they turned against Vortigern, but were defeated at Aylesford, where Horsa was slain. Ere long, however, Hongist is said to have conquered the whole of Kent.

Hengstenberg, Ernst Wilhelm, a famous German champion of orthodox theology, was born 20th October 1802, at Fröndenberg, in Westphalia, where his father was elergyman. Prepared by his father for the university, he devoted himself at Bonn chiefly to Orientalia and philosophy, whilst at the same time he took an enthusiastic part in the Burschenschaften. At first a sympathiser with rationalism, at Basel, whither he wont in 1823, he passed over to the opposite extreme, and going next year as privat-docent ta Berlin, soon put himself at the head of a rising orthodox party, whose principles he championed vigorously both in the nuiversity and through the press. In 1826 he was made extra-ordinary, in 1828 ordinary professor; and in 1829 doctor of theology. His Evangelische Kirchenzeilung, legun in 1827, combated rationalism even in its mildest forms, seeking to restore the orthodoxy and church discipline of the 16th and 17th centuries. All his works were devoted to the defence of the ald interpretation and criticism of the Scriptares against the results of modern biblical science in Germany. Hengstenberg's great influence in ecclesiastical matters was employed in the carrying out of the high Lutheran dogmas of the church, of church-offices, and of the sacraments, by persecution of sectaries, by opposition to the minu of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegschoider, De Wette, and other so-called rationalistic teachers in the universities. He died at Berlin, May 28, 1869.

His chief works were Beiträge zur Einleitung ins Alte Testament (1831-39; Eng. trans. 1847 and 1848); Christologie des Alten Testaments (2d od. 1854-87; Eng. trans. 4 vols. 1851-59); Geschichte des Reiches Gottes unter dem Alten Bunde (1869-70; Eng. trans. 1871-72); Die Weissaupungen des Propheten Erechiel (1807 68; Eng. trans. 1869); Die Juden und die Christ. Kirche (1867); and Die Blücher Mosis und Aegupten (1841; Eng. trans. 1845). His commontaries embraced the Psalms (1842-46; Eng. trans. 1845-48), the Apocalypse (1850-51; Eng. trans. 1865), and the Gospel of St John (1861-62; Eng. trans. 1865).

Henley, John, commonly known as Orator Henley, the son of the vicar of Melton Mowlray, in Leicestershire, where he was born on 3d August 1692, set up in London in 1726 what he called an 'cratory,' whence he professed to teach universal knowledge in week-day lectures and primitive Christianity in Smudny sermons. He dubbed himself the 'restorer of ancient eloquence,' and practised in the pulpit the arts of the theutrical attitudinarian. He sold medals of admission to his lectures and sermons, bearing the device of a rising sun, with the motto Ad summa and the inscription Inventam viam ant factum. Yet he was not without genius as an orator, and by this and his eccentricities attracted dubing several years large crowds to hear him preach and teach. And he doubtless drew many by his queer advertisements, sometimes quaint, sometimes sareastic, but always designed to catch the curions and the idle. His addresses were a strange mixhure of solemnity and buffoonery, of learning and ribaldry, of good sense and personalities, of wit and absurdity. Pope spits him on his literary lance in the Ducciad:

Embrown'd with native bronze, lo! Henley stands, Tuning his voice, and balancing his hands; How fittent nonscisse trackles from his tongue! How sweet the periods, neither said no sing! Oh, great restorer of the good old stage, Preacher at once, and zony of thy age.

Nevertheless he was not altogether ridiculous; he was a man of considerable knowledge, and had even some learning in oriental matters. Whilst still an undergraduate at Cambridge he sent a witty letter to the Spectator (1712), and in 1714 published a poem, Esther, which contains several passages indicative of imagination, and conched in elegant verse. After he left Cambridge he taught in the school of his mative town, and there his bubbling energy introduced several reforms and innovations. At this time he compiled a grammar of ten languages, The Complete Linguist (1719-21). But his annlation outgrew his occupation, and he betook himself to London. There, however, he did not at first meet with either the recognition or the success he expected, and he had to earn his livelihood by writing for the booksellers. He was also for some time a pensioner of Walpole, to the extent of £100 a year; for this sum he edited a weekly paper called the Hyp-doctor, the purpose of which was to heap ridicule upon Andansets. Craftsman. He died 13th October 1759, with the phrase Let my notorious enemies know I die a rational en his lips. His Oratorical Transactions contained a life of himself, purparting to be written by A. Welstede, lutt generally believed to have come from his own peu. See Nichol's Leieestershire, and D'Israeli's Calamitics of Authors.

Henley-on-Thames, a municipal borough of Oxfordshire, at the base of the Chiltern Hills, and on the left bank of the Thames, 8 miles NE. of Reading, 36 W. of London, and 24 SE. of Oxford by road (by river 47). The five-arch bridge was huilt in 1786 at a cost of £10,000; the parish church, Decarated in style, was restored in 1864; and the grammar-school was founded in 1605. Malting is a principal branch of industry; there are also breweries, and a considerable trade in corn, flour, and timber. The principal amateur regatta of England has been held here every summer since 1839. Pop. (1851) 2595; (1881) 4604. See Rowing; also J. S. Burn, A History of Henley-on-Thames (1861).

Henna, a small shrub, called by botanists Lausonia alba (also L. inermis or spinosa, the younger bushes being spineless). It is also known as 'Egyptian privet' or 'Jamaica mignonette.' Henna grows in moist situations through-

out the north of Africa, Arabia, Persia, and the East Indies. It is cultivated in many places for the sake of its flowers, which are much prized for their fragrance, particularly by the Egyptian ladies; but still more for the sake of the leaves, which abound in colouring matter, and which, being dried, powdered, and made into a paste with hot water and catechn, are very generally employed by women throughout the East to this the mile and time of the finers and cate to stain the nails and tips of the fingers and parts of their feet of an orange colour, also by men to dye their beards, the orange colour being converted into a deep black by indigo; and for dyeing of the manes and hoofs of horses, and to dye skins and leather reddish-yellow. Powdered hema leaves form a large article of export from Egypt to Persia, and to various parts of Turkey, from which they find their way to more northern countries, and even to Germany, to be employed in dyeing furs and some kinds of leather. The use of henna for staining the nails appears-from allusions in ancient poets, and from some of the Egyptian minimies—to have prevailed from very ancient times. It is perhaps the camphire of the Bible. The use of henna for hands and fect is said to check perspiration, and gives a feeling of coolness. The process has to be repeated every two or three weeks.

Hennegau. Sec HAINAULT.

Henningsen, Charles Frederick, an English soldier of fortune and author, was bom in 1815, served with the Carlists in Spain, where he rose to the command of the avalry, with the Russians in Circassia, with Kossuth in Hungary, and with Walker in Nicasagna. In the American civil war he commanded a brigade on the Confederate side; and he afterwards was employed to superintend the manufacture of Minić rifles. He died at Washington, 14th June 1877. His books are for the most part records of travel and personal adventure, but include also The Past and Future of Hungary (1852), and The White Slave, a novel.

Henotikon (Gr. henotikos, 'serving to unite'), an edict for uniting the Eutychians with the church, issued by the Emperor Zeno in 482 A.D.

Henrietta Maria, born at the Louvre, 25th November 1609, was the youngest child of Henry IV. of France, whose assassination six mouths afterwards left the balle to the unwise upbringing of her mother, Marie de Medicis. A lovely little thing, bright of eye and wit, but spailt and way-ward, she was married in 1625 to Charles I., and ward, she was married in 102 to Change A, and specially evinced her bigotry, if not by a barefoot pilgrimage to Tyburn, yet by refusing to share in her lusband's coronation. The dismissal, however, of her French attendants, and the murder of Buckingham, removed two conflicting causes of jealonsy; and for ten years Hemietta might call herself 'the happiest woman in the world—happy as wife, mother, and queen.' But she had also made herself the best-hated woman in England. Strafford fallen (she did her worst to save him), and herself menaced with impeachment, on 23d February 1642, the eve of the Great Rebellion, she parted from Charles at Dover, and, repairing to Holland, there raised £2,000,000. A year later, to Holland, there raised £2,000,000. A year later, after a great storm, during which she bade her ladies 'Take comfort: queens of England are never drowned,' she landed at Bridlington (q.v.), and, marching through England, again met King Charles near Edgehill. She sojourned with him at Oxford, until on 3d April 1644 they separated at Abingdon, never to meet on earth. At Exeter, on 16th June, she gave birth to a daughter, and in less than a fortnight had to flee before Essex to Pendennis Castle, whence she took shipping for France. A cruiser gave chase, and she charged

the captain to blow up the magazine sooner than let her be captured; but at length she landed on the coast of Brittany. A liberal allowance was assigned her, but the pinched herself to send remittanees to England; and the war of the Fronde (1648) had reduced her for a time to destinate and the war of the sender of the sen tution, when, nine days after the event, news reached her of her husband's execution. That even this crowning somow failed to teach wisdom is shown by her quarrels with her wisest com-sellors, and her efforts to convert her children. The story, however, of her secret marriage to her confidant, Henry Lord Jermyn (afterwards Earl confidant, Henry Lord Jermyn (afterwards Earl of St Albans), rests solely on gossip. After the Restoration, 'la Reine Malhenrense,' as she called herself, paid two visits to England—one of four months in 1660-61, the other of three years in 1662-65. Pepys describes her as 'a very little, plain old woman.' She died of an overdose of an opiate on 31st August 1669, at her château of Colombes, near Paris, and was buried (Bossuct preaching the funeral sermon) in the abbey of St Denis, whence her coffin was ousted at the Revolution. Revolution.

See Charles I. and works there cited; also Strickland's Queens of England (new ed. vol. v. 1851).

HENRIETTA, DUCHESS OF ORLEANS, Charles I.'s youngest child, was born 16th June 1644. Her mother, Henrietta Maria, had to leave her behind at Exeter, which in April 1646 was taken by Fairfax; but three months afterwards, disgnised as a French beggar-woman, her governess, Lady Dalkeith, escaped with her from Oatlands to Calais. Her mother brought her non Catholic. Gay, brilliant, beantiful, in 1661 she was married to Louis XIV.'s only brother, Philip, Duke of Orleans; 'of all the love he had borne her there soon remained nothing but jealonsy.' As Louis's aubassadress, in 1670 she wheedled Charles II. into signing the secret freaty of Dover; and she had been back in France little more than a fortnight, when on 30th June she died at St Cloud—almost certainly of poison, but possibly without her husband's cognisance.

See CHARLES II, and works there cited; Mdme, de la Fayette's Histoire d'Henriette d'Angleterre (1720; new ed. by Anatole France, 1882); Mrs Everett Green's Princesses of England (vol. vi. 1855); and Baillon's

Henriette-Anne d'Angleterre (1885).

Henry I., king of England, the youngest and only English born son of William the Conqueror, horn in 1068, according to tradition at Selby, in Yorkshire. His father left him £5000, with a part of which he bought the districts of the Cotentin and the Avranchin from his brother, Robert of William Rufus and Robert, Henry, although he had been imprisoned by the latter, helped him to defend Normandy, and saved his capital city, Rouen, for him. Vot. in the treaty which followed 1000 bears him. Yet in the treaty which followed (1091) he was evoluded from the succession, and his brothers jeined to deprive him of his lands. Immediately jeined to deprive inin or his lands. Aminocraces, after the death of William he rode to Winchester, seized the royal treasure, and in the absence of Robert, who was then on his way home from crusading in Palestine, was elected king by such of the Witan as were at hand, and crowned at Westminster four days after. He at once issued a charter restoring the laws of Edward and the Conqueror, recalled Anselm, and set about the stern reforms which gained him among his people the name of the Lion of Justice. He strengthened his position by a marriage He also with Endgyth (her name was changed to Matilda), daughter of Malcolm of Scotland and the good Queen Margaret, who was descended from the old English royal house. The highest honous under Heury, both in church and state, were

strictly withheld from men of English blood; yet it was on the native English support that the king relied; and in 1101, when the nobles conspired to bring in Robert, who had now returned home, the English stuck faithfully by the king born in their own land, and the Normans were powerless. Without a battle Robert was induced to resign his claims, and Henry then established his power so securely that there was peace in England to the end of his reign. On the Scottish horder also there was peace, and only twice (1114 and 1121) did Henry feel compelled to make expeditions into Wales. His controversy with Anselm (q.v.) regarding investiture, too, was conducted without bitterness on either side, and resulted in a compromise; while a later dispute with the papal see was ended in 1119 by Calixtus solemnly confirming the ancient enstone of England.

Robert had received a pension of 3000 marks, but in 1105-6 Henry made war upon his badly-governed duchy; Robert was defeated in a bloody battle beneath the walls of Tinchebrai, on September 28, 1106, and was kept a prisoner during the remaining twenty-eight years of his life. The acquisition of Normandy, the ancient patrimony of his family, had been a point of ambition with Henry; to hold it he was obliged to spend long periods away from his kingdom, and to warm a nearly constant warfare amported. to wage a nearly constant warfare, supported largely by English arms and by subsidies wrning from his lenglish subjects. The French king, Louis the Fat, and the Counts of Anjon and Flanders took part with William, Robert's youthful son; but the first war ended in the peace of Ciscox (1113) on towns forwardle to House. ful son; but the first war ended in the peace of (Bisors (1113), on terms favourable to Henry; and in the following year his daughter Matilda was married to the Emperor Henry V. of Germany, and a new alliance thus formed. The second war (1116-20) was marked by the defeat of the French king at Noyou in 1119; and in the same year he presented a formal complaint to Calixtus II. at the Council of Rheims. Henry, however, was able in a personal interview to satisfy the poper the connect of finerins. Deny, non-ext, was able in a personal interview to satisfy the pope, who sneeceded in bringing about a peace. In 1119, also, Henry's only son, William, was married to the daughter of the Count of Anjon; but in 1120 he was drowned by the sinking of the White Ship on his way from Normandy to England, and Henry's successes in arms and intrigue were darkened for life, A fresh rebellion in Normandy ended in the battle of Bourgtheronde (1124), and in cruel junishments inflicted on the principal prisoners taken. In 1126 Malilda, now a widow, came back from Germany; in the same year Honry induced the Witan to swear to receive her as Lady of England and Normandy if he should die without heirs-male; and before the year was out she was married to Geoffrey Plantagenet, the son of the Count of Aujou. In 1127 Robert's son William was put in possession of the vacant countship of Flanders; but in 1128 he died, and the wars between Henry and Lonis coased. Henry himself died on December 1, 1135, and the crown was seized by his sister Adela's son, Stephen of Blois, Henry I. was styled Beauclere, or the Scholar, in honour of his learning, which, for a king in his

Henry I. was styled Beauclere, or the Scholar, in honour of his learning, which, for a king in his ago, was not undeserving of distinction. Able he was, but crafty, passionless in his policy, and often guilty of acts of cold-blooded cruelty; yet he was at least consistent in his severity, numoved by impulses such as, generally evil but sometimes good, had governed Rufus; and even his licentiousness was judged lightly after the foul vices of the Red King. Law was administered during his reign with strictness, and generally with farmess; the innocent might new and then be confounded with the guilty, and the penalties were often sovere and barbarous enough, but, at the worst, only

individuals suffered from his cruelty, while the great mass of his subjects reaped the blessings of his lirut rule. Moreover, under the equal weight of his heavy hand, Normans and English were slowly compressed into one nation: and after the landing of Robert at Portsmouth in 1101, never again did the two races meet in arms face to face on English soil. 'Good man he was,' writes the chronicler, 'and mickle awe was of him. Durst none man misdo with other on his time. Peace he made for man and deer,'

See Freeman's Norman Conquest, vol. v. (1876); also Stubbs, Constitutional History of England, vol. i. (1874);

and Dean Church's Saint Anselm (1870).

Henry II. of England, the first of the Angevin kings, was the son of Mutilda, daughter of Henry I., and her second husband, Geoffrey Plantagenet, and was born at Le Mans, March 5, 1133. His mother, assisted by her illegitimate brother the Earl of Gloucester, had carried on a hitter war against Stephen, as a usurper, from 1139 to 1148. Henry himself, unable after his uncle's death to secure any powerful following, joined his father in Normandy. At eighteen he was invested with Normandy. At eighteen he was invested with this duchy, his mother's heritage, and within a year after became also, by his father's death, Count of Aujon; while in 1152 his marriage with Eleanor of Aquitaine, the divorced wife of Lonis VII., added Poiton and Chienne to his dominions, which now embraced nearly the whole of western France. In January 1153 he landed in England; and, after his and Stephen's armies agreed to in November, whereby Henry was declared the successor of Stephen, whose son Eustace had died during the negotiations. Stephen died the next year; Henry was crowned on 19th December 1154, and issued a charter confirming his grandfather's laws. He are once re-established the muchinery of the exchequer, handshed the foreign mercenaries, demolished the hundreds of eastles estates. The whole of the year 1156 the king spent in France, where he was employed until July in effecting the submission of his brother, Geoffrey died in 1158, and Henry, having secured his territories, spent five years' warring and organising his possessions on the Continent, whence he returned in January 1163 to enter on the disastrous quarrel with the church that fills the second period of his reign.

Heury, like his grandfuther, had come to the crown after an evil time of misgovernment and of anarchy, and his fume too is that of a lawgiver, the restorer of peace and order. His object was that of all the Norman kings—to build up the royal power at the expense of the feedal burons and of the church; but his policy, while selfish in its aim, was beneficent in result, inasmuch as he was wise enough to recognise that his power could be seemely founded only on the well-being of the people. From the barons themselves his reforms met at the time with little serious opposition; with the clergy he was less successful. Not only could they use their weapon of excommunication with terrible effect, but, being tried by their own courts, they were not amenable to the common laws of the realm, and were protected from the punishment due to their crimes; so that thieves and murderers, calling themselves clerks, would for a first offence escape with penances and deprivation of orders. To add him in reducing the church to subjection to the civil power he appointed his trusted chancellor, Becket, to the see of Canterbury. This was the great mistake of his life, for with his archbishop's pall Becket put on the king's service for the pope's. Henry compelled

him and the other prelates to agree to the 'Cona sturdy churchman, and the long and obstinate struggle between him and his monarch was only terminated by his nurder (see Becket). Henry was barely saved from excommunication by his messengers making for him an unreserved submission to the pope; but he was determined not to repeat their oath. At a later date (1174) he did penance at Becket's grave, allowing himself to be sconred by monks; but, though the 'Constitutions of Clarendon' were formally repeated, the king was ultimately successful in reducing the showship to colorally region. church to subordination in civil matters. Before Becket's death Henry bad made three military expeditions into Wales, none of them, however, of any permanent effect; and, while negotiations were pending for his absolution, he organised an expedition to Ireland. The English pope, Adrian IV., had in 1155, by the famous bull Landabiliter, given Henry authority over the entire island; and in 1167 a number of Norman-Welsh knights, having been called in to the aid of a banished king of Leinster, had gained a footing in the country. Others soon followed, among them, in 1170, Richard de Clare, afterwards nicknamed Strongbow, who married the heiress of Leinster, and in 1171 assumed rule as the Earl of Leinster. Henry was jealous of the rise of a powerful feudal baronage in Ireland, and during his stay there, from the autumn of 1171 to Easter 1172, while waiting for the arrival of the frigully lagrang from Rome. the arrival of the friendly legates from Rome, he secured the submission of kings and bishops, and left the power of Strongbow and the other nobles broken. For thirteen years his governors carried out his system of interference and persecution; and when in 1185 Prince John was appointed king of Ireland, he took with him a batch of Norman and French knights who pushed the soldiers of the first conquest aside. But before the end of 1186 John himself was driven from the country, and all was left in confusion.

The third period of Henry's reign is occupied with the rebellion of his sons. The eldest had died in childhood; the second, Henry, horn in 1155, was crowned as his father's associate and successor in the kingdom in 1170, having been married at the age of five to the little princess Margaret of France. In 1173, incited by their jealous mother, Queen Eleanor, the prince and his brother Richard rebelled against their father, and their cause was esponsed by the kings of France and Scotland. The latter, William the Lion, was ravaging the north of England with an army, when he was surprised at Alnwick, and taken prisoner, 12th July 1174. To obtain his liberty, he submitted to do homage to Henry for Scotland (see Scotland; also Edward L.). By September 1174 Henry had defeated the great league thus formed against him, and re-established his anthority in all his dominions. In the course of a second rebellion, Prince Henry died of a fever at the age of twenty-eight; and in 1185 Geoffrey, the next son, was killed in a tournament at Paris. At the end of 1188, while Henry was engaged in a war with Philip of France, Richard joined the French king; and in July, Henry, having lost the chief castles of Maine and the town of Le Mans, ill and broken in spirit, agreed to a treaty of peace, of which one of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favourite son John in the list broke his heart; and he died at Chinon on 6th July 1189.

Upon the whole, Henry was an able and enlightened sovereign, a clear-headed, unprincipled politician, an able general. He did not use power despotically; and such enemies as he could either win over or disable he spared. His reign

was one of great legal reforms. With the exchequer the ancient office of the sheriffs was restored, the jury system was extended, circuit courts were established, and a high court of justice formed; whilst the institution of Scutage (q.v.) and the revival of the old Anglo-Savon militia system did much to break the power of the great fendal lords. The earliest writer on English law, Ranulf de Glanvill (q.v.), was Henry's chief justiciary from 1180. He was ambitions for his children, but he used them so freely as counters in the great game of polities that he ultimately alienated whatever affection they had to give; yet, even so, he was sunned against deeply by both his wife and his sons. When not restrained by policy his temper was passionate and outageous; and his personal vices were those of the first Henry. Fair Rosamond (see CLITFORD) is commonly said to have had two sons by him, William Longsword, Earl of Salisbury, and Geoffrey, who became Archbishop of York, and who was faitful to him when his four legitimate sons took up a ms against him. But there is no positive evidence that the former was her son; while Geoffrey's mother appears to have heen a woman of degraded character, named Ykenai or Hikenai.

See Freeman; Stabbs, Constitutional History, and preface to vol. ii. of the Chronicle of Benedict of Peterborough (1867); and Mrs Green, Henry the Second, in 'Twelve English Statesmen' series (1888).

Henry III. of England, grandson of Henry III., and eldest son of King John, was born 1st October 1207, and succeeded to the throne on his father's death at the age of nine. His reign is one of the longest and most troubled in English history, and he himself one of its least attractive and least interesting figures. The first forty-two years are for the most part a dreamy record of misgovernment and armorated accounterment of the most part and contractions. ernment and purposeless extravagance, the next seven a period of strife and civil war, the remainder of little interest. Henry was more devout than his predecessors, and could boast more domestic virtues; but he inherited his father's faithlessness, and through all his impolicy exhibited a stubborn and through all his impolicy exhibited a stubborn determination to rule as despotically as he. The interest of the reign, however, centres not in the king, but in the birth and infancy of the English constitution. In 1227 Henry declared himself of age to govern; in 1232 he deprived Hubert de Burgh, who had ruled England well as secret and equivalently environment. regent, and as justiciary had practically continued to govern the country, of all his offices; and in 1234 he was compelled to dismiss Hubert's rival and successor, Peter des Roches. He took the administration into his own hands, and hence-forward managed everything ill both at home and abroad. A war with France cost him Poitou, and might have cost him all his continental possessions, and even his own liberty, but for the generous disposition of the French king, Lauis IX. In his boyhood, under the direction of the judicions Earl of Pembroke, he re-issued the Great Charter, though with certain important omissions; and he confirmed it more than once afterwards, but always as a condition of a money grant. He was beset with favourites, chiefly from the country of his queen, Elcanor of Provence, and he allowed exorbitant exactions on the part of the His misrule and extortion roused all classes, and in 1258 the parliament, as the assembly of the barons and bishops was already called, headed by his brother in-law, Simon de Montfort, Earl of Leicester, forced him to agree to the Provisions of Oxford (q.v.), whereby he transferred his power temporarily to a commission of barons. But jealousy and disunion among the barons soon enabled Henry to repudiate his oath, and after a brief period of open war (1263) the whole matter was referred to

the arbitration of Louis of France, who anumlled the Provisions. De Montfort and his party disregarded their agreement to be bound by his judgment, and took up arms against the king. defeated him, and took him prisoner in the battle of Lewes, on 14th May 1264. The battle was followed by an agreement called the Mise of Lewes (q.v.), more humiliating to the king than the Provisions of Oxford, Earl Simon now summoned the parliament (20th January 1265) which has since been famous as the first assembly of the sort in which boroughs were represented; although it was nearly the end of the century before the representatives of towns began regularly to sit in parliament. De Montfort's supremacy did not last long. Within a year the powerful Earl of Gloucester deserted his party, and, with Prince Edward, who had escaped from captivity, led an overwhelming army against Simon was defeated and slain at Evesham, on 4th August 1265. With this event the importance of this long, disual reign ends. Henry died on 16th November 1272, and his son Edward, though absent in Palestine, was at ence proclaimed

See Freeman, Stubbs (vol. ii.), Prothero's Life and Times of Simon de Montfort (1887), and other works

cited at Montrouv.

Henry IV. of England, the first king of the Heuse of Lancaster, was horn 3d April 1367, the son of John of Gaunt, and was surnamed Bolingson of John of Gamb, and wis strained Johnsbroke, from his bithplace in Lincolnshire. His futher was the fourth son of Edward III., his mother the daughter of Duke Henry of Lancaster. In 1386 Henry was made Earl of Derby, and married Mary de Bohm, the second richest heiress in England. For some years he led a roving life. He was present at the taking of Tunis in 1390, fountly activities here there are the charge of the fought against the heathen on the shores of the Baltie, made an attempt to reach Jerusalem in 1392-93, and commanded some English lances in the disastrons battle against the Turks at Nicopolis (1896). In 1397 he supported Richard II. in the world in which he supported Richard II. revolution which destroyed the Duke of Gloncester, and was created Duke of Hereford; in 1398 he was and was created thise of Herotord; in 1398 he was banished, and in the following year, when his father died, his estates were declared forfeit to Richard. Thereupon, in July 1399, Henry landed in Yorkshire with three small vessels. He met with no opposition; and on September 29, in the Tower, he induced Richard, who had been deserted and between the diem of the diem of the diem. trayed, to sign a remniciation of his claims to be king. On the next day Henry rose in his place in parliament and claimed the kingdom and crown, all present assenting. The net was a usurpation, for Henry's claim to succeed by right of birth was barred by the six-year-old son of the Earl of March, who was descended from an older branch. Richard was shut up in the eastle of Pourfret. There was an attempted rising on the part of his friends in the following. I support that the case of the street of the street of the friends in the following. following January, but it was easily suppressed, the leaders being beheaded by the mob; and in the middle of January 1400 Lichard died in his was more than once denied by the disaffected party, and many ernel excentions were necessary before the report that he had escaped to Scotland could be sileneed. Henry's reign was one of trouble and commotion. There were incessant rebellions, and more than one treacherous attempt was made upon his life, until in his last years he was reduced to a state of constant fear. Lawlessness, rising partly out of the great poverty and heavy taxaportal out of the great povery and deavy taxt-tion, was rife in every quarter; piracy crippled commerce, though not much more se than the increased duties laid on staples; and frequent descents were made upon the coast by expeditions from France—for the country of Richard's young queen was Henry's implacable enemy. The king's

movements, too, were constantly hampered for want of money, there being no funds available for anything beyond the most ordinary expenses of the country; and 'war treasurers' were ultimately appointed by the impatient Commons to watch the disbursement of the sums voted. In 1404 the disbursement of the sums voted. In 1404 the Illiterate Parliament, to which it had been directed that no lawyer should be returned as a knight of the shire, proposed to confiscate the property of the elergy; but the necessity under which Henry found himself of supporting the authority of the church led him not only to discountenance all such proposals, but also to permit severe enactments against heretics. On 2d March 1401 the first case in England of burning for heresy occurred, when a clergyman named William Chatrys was burned at Smithfield.

The chief disturbances of the peace of the reign, however, were occasioned by the Welsh and the Scots. Under Owen Glendower (q.v.) the Welsh maintained their independence throughout this reign, and kept up a lurassing warfare against the English. Scotland Henry invaded in 1400, besieging Edinburgh Castle until compelled by famine to retire. In 1402, while Henry was engaged against the Welsh, the Scots in turn made an irription into Northumberland with 40,000 men; but a body of some 10,000 of them were encountered by the Earl of Northumberland and his son Harry Percy, with a force computed at 12,000 lances and 7000 archers, and met with a crashing defeat (14th September) at Humbleton (or Homildon), where Searl Douglas and the Duke of Albany's son were taken prisoners. Harry Percy (Holspur) and his house shortly after broke with the king, and leagned with Douglas and Glendower against him; but the king met the Percies at Shrewsbury (21st July 1403), where the insurgents were utterly defeated, Hotspur slain, and Donglas again taken prisoner. Two other insurrections followed, but were easily suppressed; and the remainder of the reign was comparatively free from domestic troubles. In 1400 Prince James of Scotland (afterwards James I.) was captured on his way to France, and was detained and educated in England. The civil wars in France gave Henry an opportunity to send two expeditions (1411 and 1412) to that country; but in his later years le was a miserable invalid, afflicted with epileptic fits, the last of which seized him while in West-minster Abbay. He died on 20th March 1413 in the derusalem Chamber; and this was taken to explain a prophecy which had said that he was to die at Jerusalem—and as late as the preceding Novembor he certainly had hoped to go once more on crusude. Henry's last days were endittered by a dread that he would be supplanted by his eldest son. He had commenced his reign onergetic and determined to govern on constitutional principles; to this resolve he remained steadfast, as he maintained also his devoutness and purity of life; but disappointment and perhaps disease latterly made him ernel, vindictive, suspicious, and irresolute. The labour and sorrow of feunding a dynasty were his, and his usurped crown he found a heavy burden.

See Stubbs, vol. iii.; (lairdner, The Houses of Lanuster and York, in 'Epochs of History' series (1874); caster and York, in 'Epochs of History' series (1874); and especially Wylie, History of England under Henry the Fourth (vol. i. 1884). To these must be added, for the Fourth (vol. 1, 1884). To these must be dided, for this and the next two reigns, and for Henry VIII., Shakespeard's historical plays, which are based mainly on the Chronicles of Hall and Holinshed (q.v.). For their value as history, see Courtenay's Commentaries on the Historical Plays of Shakespeare (2 vols. 1840).

Henry V. was born in the eastle of Monmonth, 9th Angust 1387, the eldest of the six children of Henry IV. by Mary de Behnn, from whom he

inherited a certain taste for books. According to a local tradition, he studied for a time at Queen's College, Oxford, perhaps in 1399-1400. From 1401 we find him engaged against Glendower, and in 1403—the year of Shrewsbury, where he was wounded in the forehead by an arrow—he was a property of the himself of the control of the himself of the him appointed the king's lieutenant in Wales. Here be remained in command of operations until 1408, and succeeded at least in keeping Glendower behind the barriers of his mountains. In 1409 he became constable of Dover, and in 1410 captain of the town of Calais; and in one of these places, or in London, he resided until his father's death. The story of his committal to prison is a fiction (see GASCORGNE), and may be traced to a passage in the life of Edward II. when Prince of Wales. There is some evidence that Henry was for a time not on good terms with his father; but the charges of riot and profligacy are at least the charges of riot and profligacy are at least gross exaggerations of a young soldier's harmless, boisterous frolies. He was crowned on 10th April 1413, and at the outset of his reign liberated the young Earl of March, who was the true heir to the crown, restored the son of Hotspur to the lands and honours which his father had lost by rebellion, and had Richard II.'s body brought up from Langley and huried in Westminster. The great effort of his reign was an attempted conquest of France, now inled by an imbecile king and distracted by internal factions; and in 1414 Henry formally demanded the French crown, to which he seems to have believed sincerely crown, to which he seems to have believed sincerely that he had a valid claim, through his great-grandfather, Edward III. On 11th August 1415 he sailed with an army of 30,000 men, after crushing sailed with an army of 30,000 men, after crushing a conspiracy to carry off the Earl of March; and on 22d September he took Harflenr, after five weeks' siege, at a great cost of life, including 2000 men carried off by dysentery. On 8th October he set out on a march to Calais, and at Agincourt (q.v.), on the 25th, where his way was blocked by a French army, gained a battle against such enormous odds as to make his victory one of the most notable in history. Two years after he again invaded France, and by the end of 1418 Normandy was once more subject to the English crown. was once more subject to the English crown. Henry's forces had appeared before the walls of Paris, when the murder of the Duke of Burgmdy (10th September 1419) aroused the indignation of France against the dauphin, who had to with-draw beyond the Loire; and on 21st May 1420 was concluded the 'perpetual peace' of Troyes, under which Henry was recognised as regent and 'heir of France,' and received the French king's youngest daughter, Catharine, in marriage. In Fobruary 1421 he took his young queen to England to be crowned, having shown the same promise of just and vigorous rule as he had already done in Norwards whether a worth he was done in Normandy; but in a month he was recalled by news of the defeat at Beaujé of his brother the Duke of Clarence, by a force consisting largely of Scotch, commanded by the Earl of Buchan. Henry returned to France for a third campaign, and his wonted success in arms was attending him, when he was seized with illness, and died at Vincennes on the 31st August 1422, at the age of thirty-five, leaving an infant to succeed him. Henry was a deeply devont prince, temperate, just, and pure of life; yet his religion, though he was free from wanton erucity, did not make him merciful to a conquered enemy. He followed his father, too, though apparently with reluctance, in his treatment of the Lollards; even his old companion-in-arms, Sir John Oldcastle (q.v.), was sent to the stake. He was a brave soldier, a firm disciplinarian, a brilliant general; and he died when his fame was briottest. when his fame was brightest.

See Stubbs; Gairdner, Lancaster and York; Nicolas,

History of the Buttle of Agincourt (1827); and A. J. Church, Henry the Fifth (1889), in the 'English Men of Action' series.

Henry VI., the only child of Henry V. and Catharine of France, was born at Windsor on 6th December 1421. As he was not quite nine months old when his father died, his uncle, John, Duke of Belford, was appointed to govern France, and another nucle, Humphrey, Duke of Gloucester, to be protector of England in Belford's absence, with a council appointed by parliament to aid and control him, the parliament declining to appoint him regent, though the late king had desired it. After twenty-four years' captivity, the Scotch king, James I., was set at liberty in the hope of securing peace on the northern boider. In France, the incapable Charles VI. having died, his son the dauphin assumed the title of Charles VII., and went on fighting with the English. His army, commanded by the Scottish Earl of Buchan, now constable of France, was almost annihilated by the English at Vennenil (1424). But this victory was the last great success obtained by the English in France, and their power, which could only be maintained by force, gradually crumbled away. Gloucester's marriage with Jacqueline of Hainanht (1423) during the life of her lunsbaud, John of Brabant, had strained the allicance with Burgundy, which soon after lost its strongest link by the death of Bedford's wife, Duke Philip's sister, in 1432. In 1429 the siege of Orleans was raised by the French, inspired by Joan of Arc (q.v.); and after this the English power declined steadily, in spite of their having lurned Joan as a witch in 1431; but the struggle, though continued for twenty years, was seen to be de-perate. Bedford, the only great and statesmanlike leader on the English side, died in 1435; Paris was recovered by the dauphin in the following year; Normandy was completely lost by the fall of Cherbourg in 1450; and ultimately, in 1458, the English were expelled from all France (Calais excepted), greatly to the true advantage of both countries.

Disputes between Gloucester and his uncle, Cardinal Beanfort (a.v.) the powerful Bishon of

to the true advantage of both countries.

Disputes between Gloucester and his uncle, Cardinal Beanfort (q.v.), the powerful Bishop of Winchester, as well as war with France, prevailed during the king's minority. Besides being bodily weak, Henry inherited the mental infirmity of his grandfather, Charles VI. of France. In 1445 a wife was found for him in the strong-minded Margaret of Anjou; and in 1447 the Winchester party, supported by her, succeeded in having Gloucester arrested for high-treason. Fire days later he was found dead in his bed; but that he was murdered there is no proof, and such evidence as we have tends to the opposite belief. Beaufort, who had served the state faithfully for fifty years, survived his nephew only six weeks, and after his death everything went wrong. The want of strength in the king, as well as in his title to the crown, was an invitation to every form of faction to display itself. Jack Cade (q.v.), an Irish adventurer who pretended to be a Mortimer, obtained a temporary possession of London; but the citizens overcame him and his pillaging followers, and he was killed in Sussex. The true representative of the Mortimers was Richard, Duke of York, and he was one of the unquiet spirits of the reign. As a descendant of Liouel, Duke of Clarence, the third son of Edward III., his title to the crown was superior to that of the king, who was descended from the Duke of Lancaster, the fourth son of that monarch, and he laid claim to the crown with more or less openness, according to circumstances. His influence and address were so great that in 1454, on the occasion of

the king's weak mind being entirely eclipsed, he was appointed protector by parliament. On the king's recovery he was indisposed to give up his power, and levied an army to maintain it. On 22d May 1455 the first battle of St Albans was fought, and the Yorkists were victors; the Duke of Somerset, the queen's favourite minister for the time, was slain, and the king himself was taken prisoner. This was the first hattle of twelve that were fought between the Honses of York and Lancaster in the Wars of the Roses (for an account of the struggle, see Roses, Wars of the; see also Edward IV.). A return of Henry's disorder made York again protector in 1455-56; and en his recovery the poor king vainly strove to maintain peace between the duke's faction and the queen's. Margaret beaded the Lancastrian forces, and never relinquished the struggle; but in 1461 Edward IV. was praclaimed king, and in 1465 Henry was captured and committed to the Tower. In 1470 Warwick restored him to the throne, but six months after he was again in Edward's hands; and at Tewkesbury (4th May 1471) his son was slain and Margaret taken prisoner. Edward returned to London on the 21st May; and that night Henry was murdered in the Tower. Margaret was ransoned by Lonis XI. in 1475, and returned to France. Honry had lost both the kingdoms to which he had succeeded, and seen all his friends die vainly for his sake. The most unfortunate of kings, his reign stands out in English history as one long disaster. He himself was a just and merciful prince, pions, pure, and generous; but the gentle and saintly scholar, with his fits of imbeeility, was no lit monarch for times so rough. His highest claim on our gratitude is that he founded Eten College and King's College, Cambridge.

See Stubbs; Gairdner's Lancaster and York, and his introduction to the Paston Letters (vol. i. 1872).

Menry VII., founder of the Tudor dynasty, was born at Pembroke Castle, the seat of his nucle, the Earl of Pembroke, on January 28, 1457. His fiether, Edmund Tudor, was the son of Owen Tudor, a knight of Wales, and of his wife, Queen Catharine, the widow of Henry V.; he had been created Earl of Richmond by his half-brother, Henry VI., and died before his son's birth. His mother, Margaret Beaufort, was the lineal representative of the House of Lancaster, being descended from John of Gaunt and Catharine Swinford, whose children were legitimated after their marriage. The young Earl of Richmond was thus the nearest heir, after Richard III. had murdered his nephews, the sons of Edward IV., oxeept their sisters and Richard himsolf. After Tewkesbury he found asylm in Brittany, until he was invited to invade England and rescue it from the usurper. The first attempt (1483) ended in failure, and cost the Duke ef Buckingham his head; but in Angust 1485 Richmond landed at Milford Haven, and marched across the country to Bosworth, in Leicestershire, where Richard was defeated and slain. Henry now ascended the throne; and his marriage with Elizabeth ef York, Edward IV.'s ofdest daughter, by which the White Rese and the Red were united, was colebrated in the following January. His reign was troubled by several impostors claiming the crown first, Lambert Sinnel, an Oxford joiner's son, who professed to be the Earl of Warwiek, Clarence's son, and was procleimed king in Ireland, but was defeated at Stoke in 1487, taken prisoner, and turned into a moutal in the king's kitchen; next, Perkin Warbeek, who pretended to be the boy Duke of York, who had not been murdered in the Tewer by Richard III., and was patronised by the Duchess of Burgundy and supported by the Emperor Maximilian and James IV. of Scotland,

but was finally captured in 1497; and finally, Ralph Wilford, who also pretended to be the Earl of Warwick, but did not succeed in carrying his enterprise far, being almost at once taken and hauged in 1499. In this year Henry, to end his troubles from pretenders, had Warbeck, whom he had purdoned, and the true Earl of Warwick, a youth who had known only captivity all his days, convicted of a plot to recover their liberty, and executed. The execution of the latter is the chief hlot on Henry's memory; for the execution of Sir William Stanley, deeply though the king had been indebted to him, there appears to have been ample justification.

In 1492 Henry invaded Franco, but was bought off with a promise of 745,000 crowns; and this was the only foreign war in which he engaged, although his sneessful diplomacy gave him an influence in continental politics greater than had been attained by any king of England before him. Ferdinand and Isabella's daughter, Catharine of Aragon, was married to his son Arthur, Prince of Wales, a boy of lifteen, just before he died; and Henry's policy, added to an objection to return part of her dowry, ultimately led him to betroth her to his next son, who became Henry VIII. A marriage from which them, VIII. I marriage from when the most important consequences was that of his eldest daughter, Margaret, to James IV. of Scotland, which a century later brought about the mion of the crowns. In February 1503 Henry's queen died, and in his active eudeavours to obtain a second wife, with a sufficiently large dowry, he proposed a few months later to marry his own daughter-in-law, Catharine, who had been left a widow by Arthur the year before; and in 1506 he even offered to wed with similar projects he was still engaged when he died on April 22, 1509, leaving behind him £1,800,000, worth £18,000,000 in our currency. at 1,500,000, worth £15,000,000 in our entrency. He was a lover of peace, the friend of the church, the patron of scholarship and architecture, as well as of commerce and adventure. Bacon calls him 'a wonder for wise men,' and 'this English Solomon, for Solomon also was too heavy upon his people in exactions.' But Henry's avarice has been exaggerated. Chiefly he was a financier, yet his legislation was wise and just. He not only ruled, but lation was wise and just. He not only ruled, but governed England, and under him the country prospered and the trading-class became more powerful; the taxation was probably not se excessive as has been assumed, and the notorious extortions of the king's lawyers, Dudley and Empson (q.v.), did not touch the great mass of the people. Nor was the king greedy of gold for its own sake; 'to him,' says Gairdner, 'a large reserve was a great guarantoe for peace and seenity.' As a politician Henry was pitted against such cunning opponents as Ferdinand of Spain, and such cunning opponents as Ferdinaud of Spain, and at least matched them all in subtlety and in foresight; and the throne which he had won he left to his son stable and scenre.

See Bacon's History of Henry VII., and Gairdner's Henry the Seventh, in the 'Twolve English Statesmen' series (1889).

Henry VIII., the second of the Tudor monarchs of England, was born in 1491, and ascended the throne in 1509. He was the second son of Henry VII. and Elizabeth of York, and thus united the rival claims of the Houses of York and Lancaster. Previous to the death of his older brother Henry had been intended for the church; and this early bont of his mind must in some measure explain his life-long interest in all matters of religious faith and church government. During the first years of his reign Henry held a place in the hearts of his people such as ne English monarch before or since has ever held. This affectionate admiration, which with strangely little diminution

he retained to the last, was due to the fact that of all English kings he was the most intensely English—mentally, morally, and physically. This enthusiasm of his people was also the natural rebonud of feeling after the tame and cautious government of Henry VII., a king, in spite of all his admirable qualities, the last in the world to give rise to any such enthusiasm himself. In his casher manhood Henry was accounted the handsomest prince of his time, though foreign observers declared that his contemporary, Francis I., hore himself with a more kingly air. In all manly exercises he could hold his own with any of his subjects. His attainments and general mental cultivation were far beyond those of his great rivals, Francis and the Emperor Charles V.; and his accession to the throne was hailed with delight by such men as Colet, Easmus, and More, as the happiest onen for the new studies which had lately found their way into England.

At the date when Henry ascended the throne of England a ruler was needed with an energy of change and force of intelligence such as had never yet been required of any English prince. With the reign of Henry VIII. begins the modern period of Enropean history. The beginning of the new time was marked by many circumstances that broadly distinguish it from the age that proceeded in the proceeded of the p it. In Henry's reign began that relation of the leading powers of Europe to each other which has continued to the present day-a relation of jealous watchfulness, that insists on a 'balance of power as the necessary condition of the integrity of each separate state. To play his part in the new order, therefore, a range of policy was required of Henry far beyond that of even his most ambitions predecessors. In home affairs, also, questions were thrust upon him which touched the very existence of the nation. By the Wars of the Roses and the policy of Henry VII. the strength of the fendal barons had been broken, and the modern middle class had begun to be a force in the state. Had Henry been a weak ruler, however, there was still sufficient power left in the old aristocracy to have effected at least a temporary reaction, and to have revived the disasters of the late civil wars. Above all the new time was marked by a revolutionary spirit in all questions of religion that strained to the utmost the prudence of Henry and other contemporary princes. In Henry's reign the followers of Luther found their way into all the leading countries of Europe, and by their uncompromising zeal gave the most serious alarm to the upholders of the old the most serious marm to the upmonters or the out order. By the rise of the great rival powers, also, and by his own diminished prestige, the pope and his claims had become a question of the first political importance—a question that affected the entire development of the respective states of Europe. The question of the papal supremacy presented itself to Henry in a special form, but support or later it must have presented itself in one sooner or later it must have presented itself in one form or another, and sooner or later been decided as Henry decided it. It was impossible that the question should not alise whether certain out-grown institutions and privileges should continue in the interest of a foreign potentate, who by the very condition of his existence was now at the the strongest arm. The time, in short, was one when revolutionary forces were everywhere at work; and it is only by keeping this fact before us that we can form any real conception of the most extraordinary reign in English annals.

Shortly after his accession Henry, by the advice of his council, married Catharine of Aragon, his brother Arthur's widow—a step, as it turned out, of tremendous consequence in the destinies of England. The first three years of the reign passed without any memorable event. At home, by a

succession of shows and festivities, Henry at once gratified bis own taste for pleasure and gained an easy popularity with his people. He also gave further satisfaction by the execution of Dudley and Empson. In 1512 the real history of Henry's reign begins. As a member of the Holy League, formed by the pope (Julius II.) and Ferdinand of Spain against Lonis XII., Henry in that year began his first war by the invasion of France. The result was far from encouraging. Overreached by Ferdinand, Henry sent a body of troops to Spain, who disgraced England in the eyes of Enrope by mutinying against their leaders, and insisting on being led home without striking an effective blow. The next year Henry invaded France in person, and partly retrieved the national bonour at the so-called Battle of Spurs, and by the capture of Teronenne and Tournay. During his absence a greater trimuph was gained for England by the disastrous defeat of the Scots at Fladden, which for several years left Henry a freer hand to carry out his confinental policy.

out his continental policy.

It was in this first French war that Henry's great minister, Wolsey, began to take a prominent place in the conneils of the nation; and thenceforward till his fall in 1529 the history of this reign is little else than the history of Wolsey. A servant of Henry VII., Wolsey had early ingratiated himself with his son at once by his pliant courtliness and his consummate ability in public affairs. So carly as 1514 Wolsey was after the king himself the first man in the country. During the sixteen years of his administration the history of England is the history of its foreign policy. In this policy the chief aim of Wolsey and his master (for Henry even at his most thoughtless period never wholly neglected public business) was to hold in equipoise the two great continental powers, France and Spain, and by maintaining the position of arbiter to win for England an importance to which her own resources hardly entitled her. In pursuance of this aim the support of England was till 1525 given to Spain against France. In this first period of the reign the foreign events on which the most important consequences turned were the election of the emperor in 1519, the battle of Pavia in 1525,

and the sack of Rome in 1527.

From the election of Charles of Spain to the empire over Francis I, of France began that rivalry between these two princes which for a quarter of a century distracted western Europe with almost continuous war. It was of the utmost importance both to Charles and Francis what side Henry should take in the duel they saw before them. Both, accordingly, were eager in their proffers of friendsbip to the English king. At the Field of the Cloth of Gold, near Guisnes, in the English dominion in France, where Henry and Francis met in 1520 anid a blaze of grandenr that sorely drained the purses of both nations, a meeting took place, which, after many professions of friendship, came to nothing. Henry had hardly left Francis when he met the emperor at Gravelines, where a formal alliance between them was confirmed by the betrothal of Charles to Henry's daughter Mary, then a child of four years. The protracted struggle hetween Charles and Francis at once began, though the following year (1521), at Calais, Wolsey did his utmost as ambassadar of England to maintain the peace of Europe. The struggle proceeded with varying success till in 1525, at the battle of Pavia, Francis was brought to the verge of ruin by his own capture and the defeat of the most powerful army he had ever led into Italy. As the ascendency thus gained by the emperor endangered that balance of power at which Wolsey was ever aiming, England was now thrown into alliance with France. The sack of Rome by the emperor's troops in 1527

supplied Henry with still stronger reasons for joining France; and meanwhile domestic reasons

were arging him in the same direction.

The leading events at home during these sixteen years may be briefly told. In 1521 the Duke of Buckingham, a descendant in the female line from the youngest son of Edward 1HL, and, therefore, a possible claimant for the throne, was executed on a charge of treasen. There was little foundation for the charge; but the death of this great uobleman showed England that Henry, in spite of all his love of pleasure, was no ruler to be trifled with, while it gave continental princes a strong impression of his unlimited power over his subjects. The same year Henry published his famous book on the Sacraments in roply to Lather, and received from Pope Leo X, the title borne by all Henry's successors—Fidei Defensor, 'Defender of the Faith.' To enable him to play that part in continental affairs which he desired, Henry had frequent need of supplies beyond any of his predecessors. To raise these supplies Wolsey showed his devotion to the king by taking upon himself all the odinum of frequent and excessive taxation. In 1521 he domanded of the Honse of Commous a subsidy of £800,000, to be raised by a tax of twenty per cent. on all goods and hunds. After a vigorous protest by the house Wolsey carried his point; but the resistance he had met was a sections warning that there were limits beyond which even he could not safely praceed. To the country at large he made himself still further adious by the suppression of all monasteries with loss than seven inmates. As he devoted the revenues of these monasteries to educational purposes, this action was in the best interests of the country; but the monks were still nopular, and the people were not yet prepared for this high-handed dealing with a time-hononred institution. In 1525 Henry's expensive foreign policy again brought him into straits for money, and again Wolsey had to face pantlar feeling by the proposed is known as the Amicable Loan. On all sides it mot with the strongest opposition, and Wolsey was forced to abandon his praposal, but 'people cursed the cardinal and his adherent

The turning-point in Henry's reign, as it is a great turning-point in the history of England, is the moment when the thought first accurred to him that at all costs his marriage with Catharine of Aragon must be dissolved. In taking a step which he knew to he fraught with the most farrenching consequences to the nation Henry was determined by so many motives that it is hopeless to decide which at any one period carried it over the rest. Catharine was plain in personal appearance, cold by her natural temper, and six years older than her husband; all her chikhren, except her daughter Mary, had died in infancy, and Henry professed (and we may believe honestly enough) to see in this the judgment of heaven on an unnatural allicance; any doubt of the legitimacy of Mary might lead to a renewal of the civil wars of the preceding century; the interest of England scemed now to point to France rather than Spain as her most advantageous ally, and Catharine did not conceal her disapproval of Henry's breach with her cousin the Emperor Charles; and, lastly, Henry had set his affections on another, Anne Boleyn, a niece of the Duke of Norfolk, who soon perceived the ascendency she had gained, and knew how to use it for her own purpose. With such various motives behind him, Henry, with all the presidence as the such war one there will of his pature bent limingle

first disposed to humour Henry's desire for a divorce, and in 1528 sent Cardinal Campeggio to England to try the validity of the king's mariage with Catharine. The visit of Campeggio, whose powers had been carefully guarded, settled nothing; and the pope under pressure from the emperor revoked the ease to the Roman curia. This impotent conclusion was the rain of Wolsey, who now found himself without a friend at home or abroad. The king blamed him for the failure of Campeggio's mission; Anne Boleyn, who was new all-powerful, looked on him as the only obstacle in the way of her ambition; and Catharine regarded him as the the emperor was the main cause of all her mis-fortunes. In 1520, on an indictment for breach of pramanire, he was stripped of all his goods and honours, and dismissed from the court in disgrace. The next year he was summoned to London on a charge of high-treason, but broken in health and spirit died on the way, professing to the last his devotion to the king. 'No statesman of such eminence,' it has been said, 'ever died less hamented.' The people, who could not appreciate what he had done for England abroad in making her a year to be reakened with in all the cannot. her a power to be reckoned with in all the councils of Europe, saw in him only the haughty and vain-glorious upstart, whose entire mode of life gave the lie to his office and profession.

The period from the fall of Wolsey to the fall of

The period from the fall of Wolsoy to the fall of his successor, Thomas Cromwell, in 1540, is perhaps the most extraordinary, as it is, perhaps, one of the most important in all English history. During those years were broken link by link all the ties that bound England to the Papacy, and the country disparted from that system of the nations which men had come to regard as no less divinely ordered than the system of the heavens itself.

This severance of England from Rome was carried threngh by the parliament of 1529-36, summoned after an interval of seven years, and largely composed of the creatures of the king. Despite the coldness of the pope, Henry was as determined as ever on his divorce, and equally determined that he would not plead his cause at Rome, which would have been a direct admission of the papal supremacy. By way of relieving the scruples of the pope to reverse the judgment of his predecessors in favour of Henry's marriage, the case was submitted to the various universities of Europe. Their verdict was not manimous, but the majority declared that Henry's scruples were justified. The pope, however, with the fear of the emperor ever before him, would not be moved from his position; and, meanwhile, the English parliament, inspired by the king, proceeded with its work. By humbling the clergy Henry doubtless thought he would be most likely to bring the pope to terms. Accordingly, one blow after another was struck at their privileges till they were taught that their real master was not the pope of Reme, but the king of England. In 1531 the whole bedy of the clergy, on the same grounds as Wolsey, were declared guilty of treason under the law of pracmunite, and purchased the pardon of the crown only by the payment of £118,840. The same year he exterted from them his recognition as 'protector and supreme head of the church and clergy of England,' and the year following abolished the system of annales by which the pope received the first year's income of all newly-appointed bishops and archibishops. The tendency of all these acts could not be mistaken, and Sir Thomas More, who had succeeded Wolsey in the chancellorship, and who saw the inevitable end of Henry's policy.

would appear, of public opinion, which all through had been on the side of Catharine. The year 1534 saw the definitive breach of England with Rome. By the parliament of that year it was enacted that all bishops should be appointed by a congé d'étire from the crown, and that all recourse to the bishop of Rome should be regarded as illegal. It was also enacted that the king's marriage with Catharine was invalid, that the succession to the crown should lie with the i-sue of Henry's marriage with Anne Boleyn, and that the king was the sole supreme head of the church of England. To this last act Bi-hop Fi-her and Sir Thomas More, both men of the old order, but illustrious by their character and strainments, refused to swear, and both were executed the following year. In all his action against Rome Henry was eager that the world should understand that his quarrel was solely with the pope, and not with the doctrines of the church. The supporters of Luther, therefore, were treated with the same severity as the clergy of the old church who refused to acknowledge bim in the place of the pape. To proclaim his soundness of doctrine he ordered (1537) the publication of the Bishop's Book or the Institution of a Christian Man, in which, with the exception of the bead-hip of the pope, all the Catholic doctrines were set down after the strictest orthodoxy. It was the same anxiety to save his orthodoxy that prompted the famous Statuate of the Six Articles, known as the Bloody Statuate, in which all the fundamental doctrines of the Church of Rome are insisted on as necessary articles of belief—the severest penalties being attached to the denial of any one of them (1539). with the same severity as the clergy of the old (1539)

In 1535, following the example of Wolsey, Henry appointed a commission under the direction of Thomas Cromwell to prepare a report on the state of the monasteries for the guidance of purliament. The report, contained in what is known as the Black Dook, revealed a state of things that justifield the most drastic dealing. The commissioners were strongly disposed to exaggerate whatever evils they found, and their report is to be taken for what it is worth; yet there is abundant testimony from friends and foes alike to prove that the monasteries had outlived their function, and that their general character was fitted to depress rather than elevate the moral ideal of the nation. On the strength of this report an act was passed for the suppression of all monasteries with a revenue under £200 a year. This high-handed dealing with an £200 a year. This high-handed dealing with an ancient institution brought to a head a wide-pread discontent with the late policy of Henry. In the north of England, especially, the sympathics of the people were mainly with the old religion, and the barons and country gentlemen were generally of the same way of thinking. The people, moreover, had a real grievance in the fact that everywhere there was much misery in the country, by reason of the land being extensively converted from agricultural to pastoral purposes, and its being bought up by speculators from the towns. The year following the suppression of the smaller monasteries, therefore, a formidable insurrection, known as the Pilgrinage of Grace, was organised in the northern counties under the leadership of a barrister named Robert Aske. The revolt was crushed and failed in all its objects, for the very next year Henry gave a final blow to the ancient clurch by the suppression of all the remaining monasteries. Henry's agent in this wholesale dissolution was Thomas Cromwell, the 'Hammer of the Monks,' who, after the king himself, was now the most powerful man in England. The removal of the nonasteries was in the lest interest of the country:

the man and the time. The revenues of the monasteries to the amount of £161,100 were devoted to small pensions for the abbots and priors, and the erection of six new bishopries. The bulk of the revenues, however, passed to the crown and to those who had made themselves useful to the king.

We have again to return to the history of the king's marriages, which, in every case, it is to be remembered, have a more or less direct bearing on the policy of the reign. In 1536 Queen Catharine died, and the same year Anne Boleyn herself was executed in the Tower on the charge of infidelity executed in the Tower on the charge of inhelenty to the king. The very day before her execution Henry was married to Jane Seymonr, the only one of his wives fur whom he appears to have had any real affection and respect. The next year Jane Seymonr died, leaving a son, afterwards Edward VI. The succession being in the estimation of Henry and his ministers still insecure, Anne of Clayer was chosen as the king's fourth wife in the Cleves was chosen as the king's fourth wife, in the hope of attaching the Protestant interest of Germany. Anne's personal appearance proved so little to Henry's taste that he consented to the marriage only on condition that a divorce should follow as only on condition that a divorce should follow as speedily as decency would permit. Henry's digust with Anne of Cleves was the immediate occasion of the ruin of his great minister Cromwell. As the agent of Henry's own religious policy Cromwell had made himself as generally detested as his predecessor Wolsey. It was mainly through his action that Anne had been brought forward, and his enemies used the opportunity of Henry's indignation to effect his ruin. Accused of high-treason by the Duke of Norfolk, he was executed on a bill of attainder, without the form of a trial (1540). On the day of Cromwell's death Henry married Catharine Howard, another niece of the Duke of Norfolk, and thus seemed to lend himself to the Catholic party represented by that nobleman. Before another year Catharine suffered the same fate as Anne Boleyn, on the same charge, the same fate as Anne Boleyn, on the same charge, and in her case proved beyond dispute. A year later Henry married his sixth and last wife, Catharine Parr, wilow of Loid Latimer, a woman of character, who was happy enough to survive her husband.

During all these years the rivalry of Francis and the emperor had been the source of almost constant war, and Henry's interest in their struggle had been kept continually alive by the intrigues of France in Scotland. In 1543 Henry and Charles made a common invasion of France, which ended disgracefully for England by Francis and the emperor arranging a peace in which Henry's name was not even mentioned. In 1545 Francis made an abortive invasion of England, and the following an abortive invasion of England, and the following year Henry retaliated by another invasion of France. At length, both monarchs being alike broken in health and spirit, they concluded a peace (1546), of which, by Francis's intervention, Scotland also had the benefit.

In his last years Henry suffered much from an allow in his last years theory at times to have

ulcer in his leg, which seems at times to have goaded almost to madness a temper never very tractable or uniform. The execution of the young Earl of Surrey, son of the Duke of Norfolk, on a charge of high-treason, completes the long list of the judicial murders of Henry's reign. Norfolk himself was saved from the same fact only by the least of Henry himself. January 28, 1547

death of Henry himself, January 28, 1547.

From the revolting record of his conjugal relations and the long list of noble victims that make his rule a veritable reign of terror, Henry is apt to be hastily judged simply as an unnatural monster, borne along by motives of cruelty and lust. Yet

he inspired the most devoted affection of those in immediate centact with him. 'Had Ilenry been the wilful, capricious, and self-indulgent monarch he is sometimes represented, says Professor Brewer, the intense personal devotion of such men as Wolsey, Cronwell, More, Gardiner, and Fitz-william, so unlike each other in all respects, this one excepted, would have been the most unintel-ligible paradox in history.' In the point of personal morals Henry was purity itself compared with his contemporaries Francis and James V. of Scotland. In the sense of kingly responsibility, also, he bears the most favourable comparison with the French king. Even in the shedding of blood Henry was merciful compared with Prancis. In the case of the victims of the Bloody Statute, and even in the case of the deaths of such men as More and Fisher, we are bound to admit that Henry had a certain we are nound to admit that termy had a certain justification in principle and in the interest of the country. But in the wholesale massacro of the Protestants by Francis we have simply the gratuitous act of a monarch devoid himself of all religious conviction, prompted by the monentary caprice of sellish interest. Only a prince of the most imperious will could have effected the ecclesiastical revolution that makes Henry's reign perhaps the most important in English history. At the same time, the whole past policy of England towards Rome had its necessary result in Henry's rejection of his papel supremacy. By the law of premumire the power of the pope had ceased to be more than a form, and it only required an occasion such as the divorce of Catharine, and a king with the resolution of Henry, to snap the bond that was already worn to the extremest tennity. In the suppression of the monasteries, also, llemy in reality acted in accordance with the highest consciousness of the nation. The mass of the people were unfavourable to the revolution, but that section of the community which represented the moral sense of the nation was all on the side of Manny. This is this prepared of correlate out what Henry. It is in his manner of earrying out what was a necessary revolution, in his coarseness of nature, which deserves the harsher name of sheer hrntality, that the instinctive feeling of revulsion against Henry finds its real justification.

See the articles Wolsey, Cromwell, More, Crammer, &c.; Fronde's History of England (vols. i-iv.); The Reign of Henry VIII., from his Accession to the Death of Wolsey, by J. S. Brewer, edited by J. Cairdnor (2 vols. 1884) from the prefaces to the Rolls publications; Mandell Creighton's Cardinal Wolsey (1888); Stubbs's Lectures on Medieval and Modern History (1887); and Gasqueb's Dissolution of the English Monasteries (2 vols. 1889).

Henry, PRINCE OF WALES. See JAMES I.

Henry, surnamed The Lion (1129-1195), Dake of Saxeny and Bavaria, was the son of Honry the Proud, and the head of the Guelphs. After Bavaria, which had been taken from his father, was restored to him (1154) by the Emperor Frederick I., he became the most powerful nable in Germany, his possessions extending from the North Sea and the Baltie to the shores of the Adriatic. His great power and his ambitious designs roused against him a league of princes, ecclesiastical and temporal, in 1166; but Henry, with the emperor's countenance, was able to make head successfully against his enemies. Frederick I, at length grew alarmed, deprived Henry of his dominions and placed him under the ban of the empire in 1180. Nor was he fully reconciled to Frederick's successor, Henry VI., until about three years before his own death. Henry the Lion pursued an enlightened policy in ruling his dominions, in that he encouraged agriculture and trade; he festered the commerce of Mamburg and Lübeck, and was the founder of Munich.

Henry III., emperor of Germany, only son of the Emperor Conrad II., was born on 28th October 1017, elected king of the Germans in 1026, Dake of Bavaria in 1027, Duke of Swabia in 1038, and succeeded his father as emperor in 1039. A man of stern though pions disposition, he resolutely maintained the impedial prerogatives of power, and encouraged the efforts of the Chugniac monks to reform the ecclesiastical system of Enrope. Having summoned a council at Suthi in 1046, he put an end to the scandalous intrigues of the rival popes, Benedict IX., Sylvester III., and Gregory IV., by deposing all three and securing the election of Cloment II. in their stead. In 1042 he compelled the Duke of Bohemia to acknowledge himself a vassal of the empire. The outcome of repeated eampaigns in Hangary was the establishment of the supremacy of the empire over that kingdom in 1044. Henry also stretched his authority over the Norman conquerors of Apulla and Calabria. He died suddenly at Bodfeld, in the Harz country, on 5th October 1056. He was a zendous promoter of learning and the arts, especially music. He founded numerous monastic schools, over which he placed learned monks of Brittany, and built several churches, including the cathedrals of Worms, Mainz, and Spires, in the last of which he was buried. See Steindorff, Jahrbucher des Doutschen Reichs unter Heinrich III. (1874-81).

Henry IV., emperor of Germany, was born at Goslar on 11th November 1050, elected king of the Germans in 1054, and succeeded his father, Henry III., in 1056, his mother being named regent of the empire. She was soon ousted by the Archbishop of Cologne, and he in turn by the Archbishop of Bremen. About 1070 Henry began to act for himself. His first care was to break the power of the nobles of the land; but his measures provoked a rising of the Saxons, who in 1074 forced upon Henry humiliating terms of pacification. In the following year he defeated them in a great battle at Hohenburg, and then proceeded to take vengeance upon the princes, secular and ecclesiastical, who had ventured to contest power with him, The case of the latter gave the pope, Gregory VII., the pretext he longed for to interfere in the affairs of Germany. This was the beginning of the great duel between pope and emperor which has been already recorded under Gregory VII. (q.v.). This conflict between the representatives of secular and ecclesiastical power was marked by several dramatic events. In 1076 Henry declared the pontiff deposed. Gregory VII. retaliated by excommunicating Henry and absolving his subjects from all obedience to him. The king, seeing his vassals and princes gradually falling away from their allegiance, hastened, in midwinter, to Italy to make submission to the pape. For three days in January 1077 he was compelled to stand in the courtyard of the castle of Canossa, exposed to the inelemency of the weather, barefooted, and clothed only in the haircloth shirt of a penitont, before the pontill consented to remove the ban of excommunication. Then, having found adherents among the Lombards, Henry renewed the conflict, but was again excommunicated. His counter-move to this was to appoint a new pope, Clement III., and to hasten over the Alps and lay siege to Rome. Henry in 1084 got possession of the city and causod himself to be crowned emperor by the antipope. Gregory, who had taken refuge in the castle of Sau Angelo, was only saved by the approach of Robert Guiseard at the head of the talian and Sicilian Normans. In Germany, during Henry's long absence in Italy, three rival kings of the Germans successively found support amongst the princes. But Henry managed to triumph over them all. Crossing the Alps for the third time, he in 1090 restored the fortunes of his friend, Clement III., took Mantua, and was rapidly subduing the Guelphie princes and their pope, Urban II., second successor to Gregory, who had died in 1085, when he learned that his son Conrad had joined his enemies and been crowned king at Monza. The wearied monarch, disheartened by this adverse blow, retired to one of his Lombard castles, and abandoned himself to despair. But at length ronsing himself from his lethargy, he returned (1097) to Germany. His second son, Henry, was elected king of the Germans and heir to the empire. This prince, however, was induced to rise against his father by Pope Pascal II.; he took the emperor prisoner, and compelled him to abdicate. The emperor escaped from his prison, and found friends and safety at Liège, where he died, August 7, 1106. Henry deserved praise for the endurance and tenacity with which he struggled against the tremendous odds arrayed in opposition to him. That he was able to stand his ground at all, considering the magnitude of the task he took in hand—to break the overweening power of the great fendal nobles of Germany and to withstand papal aggressiveness incorporated in the person of a Gregory VII.—must be reckoned success of na mean character. See Floto, Heinrich IV. und sein Zeitulter (2 vols. 1855-57); Giesebrecht, Geschichte der Deutschen Kaiserzeit (vol. iii. 4th ed. 1876); and Minckwitz, Die Busse Heinrichs des IVten (2d ed. 1875).

Henry II., king of France, was born at St Germain on 31st March 1519, was married to Catharine de' Medici in 1533, and succeeded his father, Francis I., in 1547. Although an ambitious and stout-hearted prince, Henry suffered himself to be infinenced by favourites, women mostly (such as Diana of Poitiers, q.v.). Immediately after his accession be proclaimed himself of the Catholic party, and proceeded to oppress his Protestant subjects. Through the influence of the Guises, whose sister, the dowager-queen of James V. of Scotland, sought the aid of France to support her against the English government, Henry formed an alliance with Scotland, and declared war against England, which ended in 1558 with the taking of Calais, after that city had been 210 years in the hands of the English. In spite of his Catholic proclivities, ambition made him renew the duel with the empire that his father had begun. In 1552 he concluded treaties of alliance with the German Reformers, and sent an army to aid Maurice of Saxony against the emperor. His troops captured Toul and Verdun, while Montmorency seized upon Metz. After a hull in the hostilities war was renewed in 1556. In the following year Guise's design to conquer Naples was frustrated by the generalship of Alva, whilst in the Low Countries the French under Montmorency sustained a crushing defeat at St Quentin. These reverses were followed by the treaty of Cateau-Cambresis (1559). Shortly afterwards Henry was accidentally wounded in a tournament by Montgomery, a Scottish nobleman and captain of his guard. He died from the wound on 10th July 1559. See works cited at France and Catharne pe' Medici.

Henry III., king of France, the third son of Henry II. and Catharine de' Medici, was born at Fontaineblean on 19th September 1551. On the death of Constable Montmorency he received the chief coomand of the army, and in 1569 gained two decisive victories over the Protestants at Jarmac and Moneontour. He showed his zeal for the Catholic cause by taking an active share in the massacre of St Bartholomew. In 1573 the intrignes of the queen-regent secured his election to the throne of Poland. But on receiving the tidings of the death of his brother, Charles IX., he field by

night from Cracow and came home to France to succeed Charles as king (1575). His reign was a period of almost incessant civil war between the Hugnenots and the Catholics. The party of the latter, supported by the king's mother, and headed by Henry of Guise, formed the Holy League, the object of which was not merely to assert the undivided supremacy of Catholicism, but also to secure the reversion of the throne to the family of the Gnises. Henry was quite unfitted to cope with the crisis. He showed both fickleness and want of courage in his public conduct; and in private life his days and nights were spent in an alternation of dissolute excesses and wild outbreaks of religious fanaticism. His favourite companions were a band of young men (the 'Mignons') as vicious as himself. At length in 1588 the assussination of the Duke of Guise in the kiog's antechamber, and of the Duke of Lorraine in prison, fairly roused the Catholic part of the nation to the utmost pitch of exasperation. The distracted king threw himself into the arms of Henry of Navarre, and the two sovereigns marched upon Paris at the head of a Huguenot army. But on 1st August 1589 Henry of France was stabled by a fanatical Dominican named Jacques Clement; he died on the following day, nominating Henry of Navarre as his successor. With this king the male line of the house ecssor. With this king the male line of the house of Valois became extinct. See M. W. Freer, Henry III., his Court and Times (3 vols. 1858).

Henry IV., king of France and Navarre, surnamed 'the Great,' and 'the Good,' was born in Bearn in 1553. Henry was the third son of Antoine de Bourbon and Jeanne d'Albret, daughter and heiress of Henry, king of Navarre and Bearn. His father's death placed bim under the sole control of his mother and grandfather, at whose court he was trained to the practice of knightly and athletic exercises, and immed to the active habits and rude fare common to the Bearnais mountaineers. mother, who was a zealons Calvinist, was careful mother, who was a zeroms carrins, no carries to select learned men holding her own tenets for his instructors; and having discovered that a plot was on foot to remove him to Spain by force, to train him in the Catholic faith, she conducted him, in 1369, to La Rochelle, and presented him to the assembled Huguenot army, at whose head he fought at the battle of Jarnac. Henry was now chosen chief of the Protestant party-although, on account of his youth, the principal command was vested in Coligny (q.v.)—and the third of the Huguengt wars began. Notwithstanding the deringuents was began. Notwinstanding the de-feats which the Huguenots had experienced in the next campaign, the peace of St Germain which concluded it was apparently most advantageous to their cause, and was speedily followed by a contract of marriage between Henry and Margaret of Valois, the sister of Charles IX. After much opposition on the part of both Catholics and Protestants, the marriage was celebrated with great pomp in 1572, two months after the sudden death of the Queen Jeanne, which was probably due to poison, and within less than a week of the massacre of St Bartholomew. It had been originally intended that Henry was to share the fate of his friends and eo-religionists; but his life was spared on condition of his professing himself a Catholic. Three years he remained at the French court, virtually a prisoner; but at length, in 1576, he contrived to elude the vigilance of the queen-mother, and escaped to the camp of the Huguenots in Alençon. There, having camp of the Huguenots in Alençon. There, having revoked his compulsory conversion, he resumed the eommand of the army, and by his address gained several signal advantages, which constrained the king to consent to a peace highly favourable to the eause of the Reformers.

The death of the Duke of Anjon (late Alençon) gave Henry the rank, as first prince of the blood-

royal, of presumptive heir to the crown; while the murder of Henry III. in 1589 made him, in right of the Salie law, and as the nearest lineal male descendant of the royal house of France, rightful king of France. As a Protestant, lying under the ban of papal excommunication, he was obnoxions to the greater part of the nation; and finding that the Dakes of Lorraine and Savoy, and Philip II. of Spain, were prepared, each on his own account, to dispute his claims, he retired to the south until he could collect more troops and obtain reinforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Leaguers, who, in their anxiety to circumvent the ambitious designs which Philip II. cherished in favour of his daughter (nieco of Henry III.), notwithstanding her exclusion by the Salie law, proclaimed the aged Cardinal Bourbon king, with the Duke of Mayenno lientenant-general of the kingdom, and thus still further complicated the interests of their party. In 1590 Henry won a splendid victory over Mayeune at Ivry. In 1593 the assembly of the States-general, by rejecting the pretensions of Philip II, and insisting on the integrity of the Salie law, smoothed Henry's way to the succession, although it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and minister, De he not, by the advice of his friend and minister, De Rosny, afterwards Dan de Sully (q.v.), fornally professed himself a member of the Church of Rome. The ceremony of his recumbation of Protestantism, which was celebrated with great pomp at St Denis in July 1599, filled the Catholies with joy, and was followed by the speedy surrender of the most important cities of the kingdom, including even Pavis, which opened its gates to him in 1594. The civil war was not, however, wholly put down till four years later. In the same year, 1598, peace was concluded between Spain and France by the treaty of Vervins, which restored to the latter treaty of Vervins, which restored to the latter many important places in Picardy, and was otherinthly important places in Pedray, and was otherwise favourable to the French king; but, important as was this event, it was preceded by a still more memorable act, for on the 15th April Henry had signed an edict at Nantes by which he seemed to Protestants perfect liberty of conscience and the administration of impartful justice.

Henry was now left at liberty to direct his attention to the internal improvements of the kingdon, which had been thoroughly discovery.

attention to the internal improvements of the kingdom, which had been thoroughly disorganised through the long continuance of civil war. The narrow-minded policy that had been followed during the preceding reigns had left the provinces remote from the capital very much at the morey of the civic governors and large landed proprietors, who, in the absence of a general administrative violance arroanted almost soverien power trative vigilance, arrogated almost sovereign power to thomselves, raising taxes and exacting com-pulsory services. These aboves Henry completely stopped, and by making canals and roads, and thus opening all parts of his kingdom to traffic and connaerce, he established new sources of wealth and prosperity for all classes of his subjects. The mainspring of these improvements was, however, the reorganisation of the finances under Sully, who, in the course of ten years, reduced the national debt from 330 millions to 50 millions of livres, although arrears of taxes to the amount of 20 millions were remitted by the king during that period. On 14th May 1610, the day after the coronation of his second wife. Marry del Madlei and when tion of his second wife, Mary de' Medici, and when about to set out to commence war in Germany, Henry was assassinated by a faintic named Ravaillac. Nineteen times before attempts had been made on his life, most of which had been traced to the agency of the papal and imperial courts, and hence the people, in their grief and consternation,

laid Ravaillae's crime to the charge of the same influences. The gricf of the Parisians was well-nigh delirions, and in their fury they wreaked the most horrible vengeance on the murderer, who, however, had been a mere tool in the hands of the Jesnits, Henry's implacable foes, notwithstanding

the many concessions which he made to their order.

According to Henri Martin, Henry 'remains the greatest, but above all the most essentially French of all the kings of France.' His unbridled licentionsness was his worst fault, and the cause of much evil in his own and succeeding reigns; for his prodigality and weak indulgence to his favourite mistiesses. Gabrielle d'Estrées and Henrietta d'Entragues, and his affection for the natural children which they hore him were a scandal to the nation, and a source of impoverishing embarrassment to the government.

of impoverishing embarrassment to the government.

As authorities in regard to Henry II., III., and IV., in addition to the general histories of France, the following works may be consulted: Anquetil, Esprit de la Lique; Petitot's Collection of Mémoires; De la Sanssaye, Histoire de Blois; Documents de l'Hist. de France; Matthien, Hist. de Henri IV.; Memoirs and Letters of Sully, De Thou, D'Aubigné, Pasquier, Duplessis Mornay; Capefigne, Hist. de la Réforme et de la Lique; Péréfixe, Hist. de Henri IV.; M. W. Freer, History of the Reign of Henry IV. (6 vols. 1860-63); II. de la Ferrière's Henri IV., le roi, l'amoureur (1890); and Bingham's Marriages of the Bourbons (1889). For Henry IV.'s exhumation from St Denis in 1793, see the Saturday Review, Feb. 8, 1890.

Henry V. of France. See Chambord.

Henry, surnamed The NAVIGATOR (Dom Henrique et Navegador), a famous Portuguese prince, the fourth son of João I., king of Portugal, was born at Oporto in 1304, and first distinguished himself at the conquest of Centa in 1415. After the death of his father be took up his residence at the town of Sagres, in Algarve, near Cape St Vincent; and while presenting the war against the Moors of Africa, his suitors reached parts of the ocean heretofore unvisited and unknown. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he elected an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently the desputched some of his pupils on voyages of discovery, which resulted at last in the discovery of the Madeira Islands in 1418. Henry's thoughts were now directed towards the anvitorous coasts of Gninea, of which he had heard from the Moors; and in 1433 one of his mariners sailed round Cape Nun, until then regarded as the farthest point of the earth, and took possession of the coasts as far south as Cape Bojador. Next year Henry sent out a larger ship, which reached a point 120 miles beyond Cape Bojador; and at last, in 1440, Cape Blauco was reached. Up to this period the prince had borne all the expense of these voyages himself; henceforth, self-supporting societies were foroted under his patronage and guidance, and what had formerly been the affair of a single individual now became the passion of a whole nation. But Henry did not slack personally in his ellorts. In 1446 his captain, Nuno Tristam, doubled Cape Verd in Senegambia, and in 1448 Gonzalez Vallo discovered three of the Azores. Henry died in 1400, after be had the satisfaction of learning that his mariners had reached as far south as Sierra Leone.

Soo Wapplins, Entdeckungen der Portugiesen unter Heinrich dem Seefidrer (Gött. 1842); Major's Life of Prince Henry of Portugal (Lond. 1868), and his Dis-coveries of Prince Henry the Navigator (1877).

Henry of Huntingdon, English chronieler, who flourished in the beginning of the 12th century, was brought up in the household of the Bishop of Lincoln, and about 1120 became Archdeacon of Huntingdon. His chef d'aurre is the Historice Anglorum, coming down to 1154. Besides this he wrote several epistles on historical matters and some poems. His History was published for the Rolls series by T. Arnold in 1880; an English translation by T. Forrester appeared in 1853. See James Gairdner, Early Chroniclers of Europe (1879), or Arnold's Introduction.

Henry, Joseph, physicist, was hom either in 1797 or 1799, in Albany, New York. There, while apprenticed to a watchmaker, he took up the study of science, and carned means to carry him through the course at the academy, in which institution he became instructor in Mathematics in 1826. In 1832 he was called to the chair of Natural Philosophy at Princeton; in 1846 he was elected the first secreto Washington, where he died, 13th May 1878. Apart from his great services to the Smithsonian Institution, with Henry's name are associated the discovery of a relation between the number of coils of wire round the electro-magnet and the construction of the battery to work it, which prepared the way for Morse's invention, in which his principles were applied to make the instrument effective at a distance; the discovery of a singular form of electrical induction; researches in meteorology and acoustics; and the establishment of the national lighthouse board, of which he was chairman from 1871 until his death. He was LL.D. of Union (1829) and Harvard (1851), and a member of many scientific societies in America and Europe. Of his numerous papers 2 vols, were published in 1886; and a Memorial was published by order of congress in 1880.

Henry, MATTHEW, Nonconformist divine, the son of Philip Henry, one of the 2000 ministers who left the Church of England on the passing of the 'Act of Uniformity,' was born at Broad Oak farmhouse, in Flintshire, October 18, 1602. In 1687 he became pastor of a congregation of dissenters at Chester, where he remained until May 1712, when he removed to a charge at Hackney, near London. He died of apoplexy, June 22, 1714, at Nantwich, while on his return from a visit to his old friends at Chester. His principal work is an Exposition of the Old and New Testament, in 5 vols. folio (1710 and repeatedly since), which was earried down only to the Acts of the Apostles. The remainder was completed after Henry's death by various ministers, whose names are given in some of the editions. This commentary is not a critical work, but rather practical and devational in its aim, and as such occupies a high place amongst works of its class. Henry wrote several other books, which were published at London in 1830. There are biographies of him by Tong (1716), J. B. Williams (1865), Davies (1844), Hamilton (1853), and Chapman (1859); and see the Diaries and Letters of Philip Henry, edited by Matthew Henry Lee (1883).

Henry, Patrick, a great American orator and patriot, was born in Hanover county, Virginia, 29th May 1736. His father was a native of Scotland, his grandmother a consin of Robertson the historian. Henry received a share of classical education, but at an early age entered business, and married at eighteen. Having failed successively in 'store-keeping' and in farming, he became a lawyer in 1760, and three years later found his opportunity, when, having been employed to plead the cause of the people against an unpopular tax, his great eloquence seemed suddenly to develop itself. This defence placed him at once in the front rank of American orators, and his later speeches advanced him to their head. From amid the sullen murnums and remonstrances that the passage of the stamp-act evoked, his voice it was that first rose in a clear, bold call to resistance.

Throughout the war of independence he was a zealons patiot. He was a delegate to the first Continental congress, which met at Philadelphia in 1774, and delivered the first speech in that assembly —a speech that for fiery cloquence and lofty tone was worthy of so momentons a meeting. In 1776 he carried the vote of the Virginia convention for independence; and in the same year he became governor of the new state. He was afterwards four times re-elected. In 1791 he retired from public life, and returned to his practice; in 1795 he declined the secretary-ship of state offered him by Washington. He died 6th June 1799. Henry was an able administrator, a wise and far-seeing legislator; lint it is as their greatest onator that his memory lives in the uninds of most Americans. No one who has come after has approached him in ability to stir and sway the passions of an andience. The classical Life is that by William Wirt; others are Everett's, in Sparks's American Biography, and Tyler's, in the 'American Statesmen' series (Boston, 1887).

Henry, ROBERT, a Scottish historian and divine, was born at St Ninians, in Stillingshire, February 18, 1718. He studied at the university of Edinburgh, and from 1768 till his death in 1790 was one of the ministers of that city. In his History of Great Britain on a New Plan (6 vols. 1771-93) he adopted the 'new plan' of devoting chapters to the social aspects of successive periods, and thus tracing the progress of civilisation in Great Britain; but the work has no pretensions to citical acumen or even strict accuracy, and consequently is now of little value.

Henry, William, a chemist, was born at Manchester, 12th December 1775, and died on 2d September 1836 at Pendlebury near that city. In 1795 he began to study medicine at Edinburgh, but at the end of his first session he returned home to superintend a chemical business which had been established by his father, and it was not until 1805 that he was able to resume his studies at Edinburgh. He only practised for a short time in Manchester, preferring to devote hunself to original investigation in chemistry. He was the author of some very valuable papers in the Philosophical Transactions (chiefly on the chemistry of the gases); and his Elements of Experimental Chemistry, in two volumes, which was published in 1799, reached an eleventh edition in 1829. Henry was awarded by the Royal Society the Copley gold medal in 1809. The Memoirs of the Manchester Society are chiefly indebted to him and to Dalton for their high scientific character.

Henryson, Robert, Scottish poet, was born about 1425, and was most likely educated abroad. He is usually designated schoolmaster of Dunfermline, and he seems besides to have practised there the profession of a notary. His death may safely be put about the end of the 15th century. Of his poems the most important is his Testament of Crasseld, in the form of a kind of supplement to Chaucer's poem on the same subject. Another, Robene and Makyne, is especially interesting as the earliest extant specimen in the Scottish dialect of mastonal poetry. Other works are a metrical version of thirteen of the Fables of Æsop, with morals suited to the questions of the time, and the somewhat feeble Orpheus and Eurydice. All previous editions of Henryson's poems were superseded by that of Dr David Laing (Edinburgh, 1865).

Henslowe, Philip, a stage manager in Shakespeare's time, was originally a dyer and starchmaker, but became in 1584 lessee of the Rose theatre on the Bankside. From 1591 till his death in 1616 he was in partnership with Edward Alleyn, (q.v.), who married his step-daughter in 1592. Henslowe's business diary from the year 1593

to 1609 has fortunately been preserved at Dnlwich College, and contains invaluable information about new plays and all the stage business of Shakespeare's day. It was edited by J. Payne Collier for the Shakespeare Society in 1841, but his reprint is unreliable, marred by many ugly interpolations and worse.

Hepar (Gr. hēpar, 'the liver') is the name given by the older chemists to various compounds of sulphur, from their brown, liver-like colour. Hepatir means belonging to the liver; as, hepatir artery, vein, duct, &c. Hepatira is a term for medicines which affect the liver and its appendages.

Hepatica, a genus of hardy perennial plants belonging to the natural order Rammenlacee, closely related to Anemone, and formenly included in that genus under the name A. Hepatica. H. triloba is the best-known species, and has long been extremely popular in the flower-guiden on account of its flowering in early spring in great profusion; the flowers of the several varieties being also very brilliantly coloured. The normal colour of the species appears to be pumple, but there are varieties with red, deep blue—of these there are single and double-flowered forms—and pure white flowers. It is a native of many hilly parts of Eurape. Its roots are powerfully astringent, but have not the acid qualities possessed by many of the Rammenlacee. H. anyalosa is the only other species known to cultivation; it is larger in all its parts; the flowers are pale blue. It is a native of Transylvania, and hoth species delight in partial shade rather than full expanded to the sum.—For another kind of Hepatice, see LIVERWORTS.

Hepatitis (Gr. hēpar, 'the liver'), inflammation of the Liver (q.v.).

Mephæstus, the god of fire and of smithying among the Greeks, is represented by Homer as lame, walking with the aid of a stick, and panting as he goes. It is character is good-tempered, affectionate, and compassionate (cf. Æsch. Promethens Bound). There is also an element of the comic connected with him; his goit and mugainly figure provoke the langither of the gods. On the other mund, he is himself given to practical jokes; he constructs a seat on which his mother sits down, but from which she is mable to rise. His mother was Hera, who (according to Homer) liked her hume child so little that she east him far out from heaven. Another account of his fall from heaven is also given by Homer—that Zens threw him out for siding with Hera against him. The story of the seat just mentioned is brought into connection with the former version of his fall; none but he could release Hera, nor would he help her until restored to his place in heaven. Mythologists interpret the fall of Hephæstus as the full of lightning from the sky (= Hera, but see Hera). Amongst the myths in which Hephæstus is concerned we must mention that of the manufacture of the first woman, Pandora (by whom all evil came into the world); the birth of Athene from the head of Zens, when Hephæstus with an axe acted as midwife; and the birth of Erichthonios, who claimed Hephæstus for father, and from whom the Athenians connted themselves as descended.

In discussing the origin and antiquity of Hephaestus it is necessary to bear in mind that this deity appears under two aspects, which would naturally come to be combined though they were not necessarily united from the first. Hephaestus is the god of smithying and also the god of fire. To begin with the latter aspect of the deity, there are so many points of resemblance between the divine smith of the Greeks and the Wayland Smith (q.v.) or Wieland or Volundr of the northern members of the Indo-European family of peoples that some

comparative mythologists have felt justified in inferring that the divine smith was a conception known to the Indo-Emopeans before their disper sion. On the other hand, it is maintained that the resemblances are due, not to the joint inheritance by different peoples of the same original myth, but to horrowing at a late period. The stories of Wieland horrowing at a late period. The stones of Wieland were a conscious form on the part of the Tentons, in the 6th century A.D., of various classic tales about Davdalus and Vulcan (W. Golther, Germania, ad. axiii. 449). This latter view has in its favour the fact that the undivided Indo-Europeans were unacquainted with the metals, except copper, and totally ignorant of the art of smithying. The divine smith, therefore, is a mythological conception which must be posterior to the dispersion of the Indo-Europeans. Remains the question then whether the other aspect under which Hephastus appears, that of the god of fire, goes back to primeral times. On the one hand, other Indo-Emopean peoples have fire-gods of their own; the Hindus Agni, and the Norsemen Loki. But, unfortunately, there is no phonetic identity between the names of the various deities. We have there-fore nothing beyond general considerations to guide us. The want of philological equivalence in the manes of various fire-gods makes rather against the supposition that the mimitive Indo-Europeans recognised a god of fire. On the On the other hand, there is no improbability inherent in the assumption that they were ut least as far advanced as the Australian aborigines who worship fire. The fact that several members of the ludo European family agree in the worship of a fire-god does not, of course, demonstrate that the worship was a joint inheritance, for the worshipper's idea of worshipping so useful an element occurs independently to peoples who cannot be supposed on any theory to be connected. Finally, the lamones of Hephrestus may be an expression of the unsteady, flickering motion of flune; but it is well to remember that amongst savages the people to whose lot it particularly falls to tend the fire are the lame.

Hephristus was by the Romans identified with their own fire god Vulcan (q.v.).

Heptam'eron. See MARGARET OF NAVARRE Heptarchy, the mane sometimes applied to the seven kingdoms supposed to have been established by the Saxons in England. The term is completely misleading if it be taken to mean that there were neither more nor less than seven distinct kingdoms in the country down to the time of Egbert; but is permissible enough if taken to mean only that the chief kingdoms at various periods from the 5th to the 9th century were Wessex, Sussex, Kent, Essex, East Anglia, Alercia, and Northmobria (see England). The shudowy sovereignty of the Betwalda is discussed under that bend.

Heptateuch, a word sometimes used for the lirst seven hooks (Gr. hepta, 'soven;' teuchos, 'instrument,' 'volume') of the Old Testament—formed on the analogy of Pentateuch and Hexateuch. See Binle, Vol. 11, p. 119.

Hera, the daughter of Kronos, the sister and at the same time the wife of Zens, was the Greek goddess of marriage, child-birth, and menstruction. In the Hiad she takes the part of the Greeks, and hates the Trojans, because Paris awarded the fatal apple of discord to Aphrodite. She is the mother of Hepharstus, the god of fire, of Ares, the god of war, of Eileithyia, of Heente, and of Hebe. Three towns, according to Homer, are especially dear to her—Argos, Sparta, and Mycene. She is tepresented by the poet as jealous and ill-tempered. As the goddess of lawful marriage she perseentes the illegitimate offspring of her consort Zens, such as Herneles and Dionysus. She conspires against

Zeus, who makes reprisals by hanging her up from beaven with golden fetters on her hands and a couple of anvils on her fect. In consequence she sub-equently preferred to thwart him secretly rather than dery him openly.

Many interpretations of this figure in mythology Many interpretations of this figure in in thology have been given in ancient and in modern times: Empedocles and Euripides regarded her as the goddess of the earth; Plato, and after him the Stoies, as the goddess of the clouds. In modern times she has been regarded as the goddess of the lower air, which is, like Juno in Virgil, varium et mutabile semper, in contrast to Zers, who is the god of the serene and upper ether. Roseher (Stud. z. Vergl. Myth. d. Gricchen u. Romer) interprets her as a moon-goddess of Graco-Italian times. He bases this view on the fact that she re-embles all other maon-godde-es in being the godde-s of women, and in presiding over men-truation and child-hirth; in possessing as her attributes the torch, the bow, and the crown of stars; in the fact that the new moon was the time for her festivals, and finally, on the resemblance between Hera and Junn. As regards the resemblance between these two galdenes, they are each the spouse of the supreme god of the sky, they have the same functions relatively to women, their cult and attributes are similar; and finally, the ancient Epinotic name for Hera was Dione,

which corresponds phonetically to Juno.

The ancient identification of Hera with the earth nay at once be dismissed. There is no resemblance between Hera and Gaia, or any other eithemian (earth) deity. Nor ean she be regarded as a goddess of the lower air; goddesses of the air are unknown to any related people, and no primitive table (many other tribe than that of mythologists) would distinguish between the lower air and the serene ether. If it is an unalterable canon of mythology that all deities must be nature myths of some kind, then Roscher's interpretation of Hera as a moon-god-dess is the most probable. Otherwise we may be content to seek the origin of Hera simply in the necessity under which the worshippers of Zens lay of providing him with a spouse. And here it be-comes a point of some importance to determine at what period Hera was created—whether before the dispersion of the Indo-Europeans, or after their dispersion, and while the joint-ancestors of the Greeks and Italians yet lived together in a Græco-Italian period, or in purely Greek times. Now, no one claims that Hera dates from before the dispersion of the Indo-Europeans—i.c. from the time when Zens, though the supreme god, was still to the average Indo European mind also and always the sky. Nor can Roscher be said to have made out his ease for the Greco-Italian origin of the goddess; the fact that Dione in one part of Greece was once the supreme goddess, and was dethuoned by Hera, is not enough to prove that Hera was generally, or indeed ever, known as Dione; and, further (to say nothing of the fact that Diana rather than Juno is the phonetic equivalent of Dione), there is no identity between the mytholo-gical functions of Dione and Juno on the one hand, or of Dione and Hera on the other. As for the resemblances of Hera and Juno, they are not greater than might reasonably be expected: Greeks and Italians, alike inheriting the sky-god (not from a Greco-Italian period, the very existence of which is doubtful, but from primitive times), would alike feel the necessity of providing him with a wife; and if in both cases the wife of the supreme god came to be regarded as the goldless of marriage, and of all appertaining to it, the coincidence is not astonishing when we reflect on the considerable similarity between the two peoples. If then Hera have not late from before purely Greek though the does not date from before purely Greek times, the necessity for interpreting her as a nature-myth is 250

considerably weakened, for as long as Zens was but the sky we should expect that he could only be married to some nature-power; but when the personality of the god had come to be usually conceived apart from the element from which he originated, we should expect that his consort would be in mythology what she undoubtedly was in ait -merely the feminine counterpart of the supreme deity. And, finally, on this view Hera's resemblance to moon-goddesses would be the result of her position as the godders of marriage, instead of her position as the goddess of marriage being the ie-nit of a limar origin.

Heracleia, an ancient city of Magna Graccia, situated near the river Acin's, about 3 miles from the Gulf of Tarentum. It was founded about 432 R.C., and under the Romans became a prosperous and refined city, though it never acquired any historical prominence. Near it, however, Pyrihns defeated the Romans in 280 B.C. In the neighbonilood, besides a large number of coins, ranking among the very finest relies of antiquity, there have been discovered (1753) two bronze tablets (Tabular Heraeleenses), containing a copy of the Lex Julia Municipalis (45 B.C.), and forming one of the principal anthonities for a knowledge of the municipal law of ancient Italy. This inscription has been published by Muratori, Savigny, and others. Two other cities of this name deserve mention: (1) HERACLEIA MINOA, between Agrigentum and Selinus, on the south coast of Sicily, originally a Phonician town; and (2) HERACLEIA PONTICA, on the coast of the Black Sca in Bithynia, destroyed by Catta in the Mithridatic war.

Heracli'an, an officer of the Emperor Honorius (q.v.), who as governor of the province of Africa rendered good service during the invasion of Alaric. He became consul, but, revolting against Hunorins, was defeated on invading Italy (413 A. n.), and slain soon after in Africa.

Heracli'dæ means, in its widest sense, all 'the descendants of Heracles' (Hercules), but is specially applied to those adventurers who, founding their claims on their supposed descent from the great hero (to whom Zens had promised a portion of the land), were said to have joined the Dorians in the conquest of the Pelopounesus. Several expeditions were undertaken for this purpose, the last and greatest occurring eighty years after the Trojan war. The chiefs of the invaders defeated Tisamenus, son of Orestes, and grandson of Agamennon, and took possession of the Peloponnesus. See GREECE.

Heracli'tus (Gr. Hērakleitos), a Greek philosopher, was born at Ephesns, in Asia Minor, and flourished about 500 B.C. He is said to have resigned the hereditary office of 'king' of his native city in favour of his younger brother, and to have given himself up to a life of solitary contemplation. In the old traditions he was called, from his release was represented. from his gloomy way of looking at things, 'the weeping philosopher,' in contrast to Democritus, 'the laughing philosopher.' He died at the age of sixty. The result of Heraelitus' meditations was a work On Nature, of which only a few obscure fragments remain. The fundamental tenets in his philosophy are that all things are in a constant finx of becoming and perishing, that fire is the primoidial principle of all existence, and that the supreme law of existence is the harmony that results necessarily from the operations of universal reason. His enigmatical fragments were published by Bywater in 1877. See Die Philosophie des Herakleitos des Dunklen (1858) by the famous Socialist Lassalle.

Herac'lius, a Byzantine emperor (610-41), of splendid but fitful genius, was born in Cappu-

docia about 575 A.D. In 610 he headed a revolt against the tyrant Phocas, slew him, and ascended his throne. At this time the empire was in great straits: the Avars threatoned it on the north-west. and the Persians invaded its frontiers from the Enxine to Egypt. The armies of Khosrau (Chosroes) II. cuptured Damascus in 613, and in the following year Jernsalem, from which they carried off the sacred cross; then Syria and Egypt were conquered, and the whole of Asia Minor to the gates of Chalcedon, over against Constantinople. At length Heraelins bestirred himself, and, having in 620 concluded a treaty with the Avars, set about disciplining an army. Two years later he took the field against his eastern enemy, and in a series of most brilliant campaigns utterly routed the generals of Persia several times in battle, wan back his lost provinces, shut up Khasran II. within the walls of his strong capital of Ctesiphon (628), and compelled him to restore the true cross, which Heraclins solemnly carried back to Jerusalem in 629. Two years later a new and more formidable enemy appeared in the south-east—viz. the followers of Mohammed, who speedily won from the Christian cooperor nearly all that he had gained from the Persians, the people of Asia Minor alone opposing any resistance to their impetuous entlusiasm of conquest. Meanwhile Heraelius, strange to say, wasted his time within his palace at Constantinople in inexplicable inactivity, partly in reprehensible self-indulgence, partly in theological disputes. He died in 641, leaving the thrane to his son, Constantine III. See Drapeyron, to his son, Constantine II L'Empereur Héraelius (1869).

Herald (Old High Ger. huriold-i.e. hari-wald, 'army strength'), an officer who was in early times the messenger of war and peace between sovereigns, and of defiance and courtesy between knights, his office also including the superintendence of jonsts once this menting the superintendence of joists and tournaments, and the regulation of public ceremonials. When the bearing of coat-armour came to be reduced to a system its supervision became in France, England, Scotland, and some other countries one of the functions of the herald. A herald was generally attached to every order of knighthood. Heralds had their attendants, called knighthood. Heralds had their attendants, called pursaivents, who were presumed to be learning the duties of a herald. Both had official titles; and often not only savereigns, but the greater nobles, had their heralds and pursaivants. English records and eliminicles of the 14th and 15th centuries contain allusions to York, Windsor, Chester, Laucaster, Arnudel, Charencieux, Leopard, and other heralds, and to Falcon, Porteullis, Antelope, and other pursaivants; and in Scottish records of the same date the heralds mentioned include Lyon, Rothesay, Marchmont, Snowdonn, Hay, and Rothesay, Marchmont, Snowdonn, Ilay, and Albuny, and the pursuivants Carrick, Diligence, Unicorn. In France, England, Scotland, Burgundy, and some other countries the chief of the heralds acquired the title of King-of-arms, and had more or less a judicial power of regulating the hearing of cont-armour. The office of Montjoic rot d'armes in France is as old as the 13th century. In England in the reign of Edward III. there were two kings-ofarms-Norroy and Surray-the jurisdiction of the one being to the north, the other to the south of the Trent. The designation Surroy was changed by Trent. The designation burroy was charge king Henry V. to Clarencieux. And the same king bironfarms called Garter, who instituted a new king-of-arms called Garter, who was to be connected with the order so called, and to be principal king-of-arms of England. In Scottish recents mention first occurs of Lyon King-ofarms (who took his title from the lion in the royal shield) in the beginning of the 15th century. The title of Ulster King-of-arms was created in the reign of Edward VI.; but there existed an Ireland King-of-arms at an earlier date. Certain fees were

secured to the English kings-of-arms and heralds in connection with public ceremonials and creations of peers in 1408; and in 1483 Richard III, incornorated them into a collegiate body, known as the Heralds' Callege, or College of Arms, presided over by the Earl Marshal (whose office is hereditary in the family of the Duke of Norfolk), the other officers Claimetenx and Norroy nuder him, besides six heralds, named Chester, Windsor, Laneaster, Richmond, York, and Somerset, and four pursuivants, Bluemantle, Portculls, Ronge Dragon, and Rouge Croix. A residence was at first granted to the heralds, called Cold-harbour or Pulteney's Inn, in the parish of All Saints; and in 1554 Queen Mary gave them a building opposite St Bennets, which was rebuilt after the great fire of 1666, and is still the official residence of the officers of arms and depository of their archives. Heralds extraordinary are sometimes appointed by the crown, who are not members of the Heralds' College.

The College of Arms has no jurisdiction out of England, Functions similar to those which the English kings-of-arms exercise under the Earl Marshal are discharged by Lyon King-of-arms in Scatland, and Ulster King-of-arms in Ireland, directly under the crown. There are under Lyen three heralds, Rothesay, Marchmont, and Albany, and three pursuivants, Unicorn, Ente, and Albany; their duties are chiefly connected with public cere-monials and royal proclamations. Lyon's armorial functions are exercised alone, as judge in the Lyon Court, where, however, the clerk of ceurt or his deputy is sometimes a herald.

A tabard with the royal arms embroidered en both sides of it has leng been the ollicial dress of heralds and pursuivants. The tabards of the kings-of-arms are richer in material. The insignia of the latter also include a crown, a baton or sceptre, and a chain with a medal or badge attached to it.

Heraldry is in its original and more comprehensive senso the knowledge of the whole multifarious duties of a Herald (q.v.); in the more restricted signification in which the torm is used by most modern writers, and that assigned to it in the present article, it is a knowledge of the laws that regulate armorial insignia—i.e. the devices that regulate armorial insignia—i.e. the devices that appear on shields, with their attendant crests, supporters, and badges. After occupying for ages the attention of the learned, and ferming an important branch of a princely chreation, this study fell for a time into neglect and disrepute, and was abandoned to coach painters and undertakers, a degradation owing in part to the endless tissue of follies and mystillections with which it had been interwoven. Modern criticism has rescued heraldry from these podantries and absurdities, and imported to it a new interest as a valuable aid to historical investigations.

Instances occur in remote times of nations, tribes, and individuals distinguishing themselves by particular emblems or ensigns—e.g. the standards of the twelve tribes of Israel, of the Egyptians and Assyrians, and the Roman cagle and cohort ensigns. Figures, symbolical and ornamental, singularly like some of those of heraldry, are found mixed with other emblems in Egypt, China, India, Japan, on Etrusean vases, and on Greek coins; and shields decorated with devices are described by both Homer and disobylus. Vot those is apparetic negative negative and Æschylus. Yet there is exhaustive negative evidence that nothing that can be properly called armorial devices were used either on shields or banners before the middle of the 12th century. The shields of the French knights in the first crusade presented a plain face of solid metal, nor is there any certain evidence of annoral bearings having been in use in the second emaade, 1147 A.D. The representation of the Norman invasion and conquest

of England on the Bayenx Tapestry (q.v.) contains on the shields of both Saxons and Normans figures of a semi-armorial character, including dragons, crosses, roundles, irregularly arranged, also striped banners; but there is no attempt to individualise the arms of the different heroes of the fight. Yet the rade devices on these shields seem to have been the precursors of systematic armory; and in the later half of the 12th century similar figures began to assume the permanent or hereditary character which is essential to the idea of armorial cusigns. Their use began with the French and Germans, and soon spread from France to England. The other nations of Europe followed; and their nearly simultaneons adoption seems to have been in part the result of the intimate intercourse which the crusades brought about between the chief sovereigns and warriors of Europe. Tomnaments helped to bring arms into fashion, and before long the bearing of hereditary arms on shields and banners became one of the most prominent features of medieval life. Some sort of armorial insignia were certainly depicted on the shields horne in the third crusade, which took place in 1189; and in the same century originated the Henra-de-lis of France, and the lious or leopards of England. In the 13th century the practice was introduced of embroidering the family insignia on the surcoat worn over the hanherk or coat of mail, whence originated the expression coatof-arms. Arms were similarly embroidered on the jupon, cyclas, and tabard, which sneceeded the sur-coat, and also enamelled or otherwise represented on furnitine, personal ornanents, and weapons. Sealing had, before the introduction of headdry, weapons. become a legal formality necessary to the authentication of a deed, and from the 13th century onwards the scals of all persons of noble or gentle birth represented their armorial ensigns (see SEAL). Those scals, appended to charters, are among the most valuable materials for tracing the history of heraldry, though they labour under the disadvantage of not indicating colours, as the arms on painted windows do.

Among important adminicles for the study of English heraldry are certain extant rolls or records of arms of the times of Henry III., Edward I., Edward II., Edward III., and also of later reigns, in the British Museum, Heralds' College, and elsewhere—a good many of which have been published or privately printed. The earliest of these, of date 1240 to 1245, show that heraldry had at that date been reduced to a systematic shape. In most cases the arms on these rolls are verbally described; in a few instances they are drawn. Along with the rolls of arms may be classed a heraldic poem known as the Roll of Caerlaverock, in which are recited in Norman-Prench the names and arms of the knights banneret who were present at the siege of that fortress in 1300. It was edited by Sir Harris Nicolas (1828), and by Thomas Wright (1861). Only a little later in date is a manuscript armorial of all Christendom, the work of a Flemish herald of the middle of the 14th century, preserved in the Royal Library at Brussels, in which the shields are beantifully illumined in colours, with, in many cases, the addition of helmets and crests; it has been reproduced in fac-simile by M. Bonton. A valuable Swiss roll of the same century has been fac-similed in the same way by the Antiquarische Gesellschaft of Zurich. Anthentie materials of this kind enable us to trace the steps by which the usage of arms reached the still more systematised form which it assumes in the works of the established writers on heraldry. In the hands of these authors, the carliest of whom wrote at the end of the 14th century, the historical part of the subject had been obscured by a tissue of fictions, which had a very misleading effect down to a quite recent time. The arms assigned to our forefathers Adam and Noah, to the old Jewish and pagan worthies, and to the Apostles, have long ceased to be helieved in; but till a very recent date the coats of Edward the Confessor and of William the Conqueror were regarded as thoroughly historical. No less spurious than the arms of Edward the Confessor are those given by George Rüxner, herald to the Emperor Maximiliam L., in his Thurnachbach to knights of Germany of the 10th century, and his Leges hastiludiales of Henry the Fowler, who flourished two hundred years before the earliest germs of heraldry, one of which laws made it imperative for the combatants in tournaments to have horne 'insignia gentilitia' for four generations. These laws of Henry the Fowler have imposed not only on the German armonialists of last century, but on Mr Ellis, who in his ingenious plea for the antiquity of heraldry, appeals to them with full faith in their genuineness. Modern German critics, however, reject them as a pulpable forgery.

In the infancy of heraldry every knight seems to have assumed what arms he pleased. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims and Crusaders, were all fixed on; and whenever it was possible, the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. The chargo fixed on was used with great latitude, singly or repeated, in any way which the hearer of the shield chose, or which the form of his shield suggested. But as coats-of-arms multiplied, different knights occasionally fixed on the same symbol, and the confusion which arose from the similarity of coats-of-arms could only be obviated by a restricted being placed on the bearer's funey, and regulations being introduced regarding the number, position, and colour of the charges, and the attitudes of the animals represented. As heraldry became more and more consolidated into a system, the true origin was lost sight of, and the fertile imagination of the early armonalists led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating the adventures or achievements of the founders of families. The legends ascribing an origin of this kind to early armorial bearings have, wherever it has been possible to investigate them, proved fabrications. For the first few centuries of the existence of heraldry a very large number of the insignia, both of families and of kingdoms, were, as already remarked, armes parlantes, though the allusion can now in many cases be traced with difficulty. The lion of Leon and Louvain, the castle of Castile, the hear of Berne, the column of the Colonna family, are wellknown continental examples; and in England we have three forntains for Wells, a whirlpool (gniges) for Goiges, a calf for Vele. At the same time commemorative heraldry, which became common in later times, was not absolutely unknown in the 14th century, one of the earliest instances being the heart introduced into the Douglas coat, in memory of the pilgrimage of the good Sir James with the heart of his royal master, found on the seals of the Douglas family as early as 1356.

As no two families in the same kingdom were allowed to hear the same arms, the right to hear a particular coat sometimes became a matter of fierce dispute. It lay in England with the constable and marshal, as judges in the Court of Chivalry, to decide questions of this kind, with a right of appeal to the king; and one of the most famous contests before them was that between the families of Scrope and Grosvenor, in 1385, for the right to hear the coat azure, a bend or; when John of Gaunt was one of the witnesses examined, and the undifferenced coat was adjudged to Scrope.

In course of time the right to use a cont-of-arms became, like the jus imaginum, the distinctive privilege of the neble, the word being used here in the continental sense, analogous to the English Gentleman (q.v.); and the privilege transmitted to all his descendants in the male line. When a prince made a plebeian noble, as it was competent for him to do, the patent of nebility defined what

arms he was to bear.

In England a proclamation of Henry V, restrained the private assumption of armorial insignia, by prohibiting all who had not benne arms at Agincourt to assume them, except in virtue of inheritance or a grant from the grown. On the establishment of the Heralds' College (see Herald) in 1483, the regulation of matters armorial was to a large extent delegated to the kings-of-arms and heralds acting under the Earl Marshal. Periodical visitations of the different counties were directed to be made to take cognisance of the arms, podigrees, and marriages of the nebility and gentry of England. These visitations went on at varying periods from 1528 down to 1704, and are the principal source of evidence as to the hereditary right to bear arms in England. Among the functions exercised by the English kings-of-arms (the chief of whom is Gatter King-of-arms) are the assigning of appropriate insignia to persons who have acquired a social importance that outlites them to take their place among the gentlemen of cast-armour of the country. Lyon King-of-arms, hesides being a judicial officer laving cognisance of all questions regarding the right to arms, exercises by direct delegation from the crown sindlar functions in the case of Scotsmen in the way of granting arms to non homines; as does Ulster King-of-arms in the case of Irislanca. The wrongful assumption of arms is still in Scotland, if not in England, an act for which statutory penalties can be enforced against the assumer.

While there is nowhere on the Continent an institution similar to the English Heralds' College, there still exists in Prassia, Anstria, Bavaria, Russia, Holhard, and Belginm, and some other continental countries, a direct supervision of armorial insignia, which takes place through the chancery of the orders of the kingdom. In Sweden and Norway the abelition of titles of nobility has made the administration of armorial matters more lax, though the preservation of the orders of knighthood implies a chancery or office of regulation so far as they are concerned. In France there is now no juge d'armos; and spurions heraldry lignres largely on cardages and claswhere in Paris. In the United States the stars and stripes are said (erroneously, it would appear; see FLAG, Vol. IV. p. 665) to be derived from the arms of Washington; and it is not unusual for individuals and families to trace their descent from old-world horses, and

the British colonies,

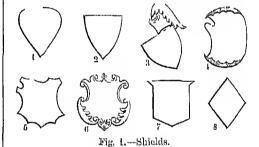
Not only families, but kingdoms, feudal lord-ships, towns, episcopal sees, abbeys, kings-of-arms in their official capacity, and corporations may by heraldic usage bear arms. The arms of two or more states ruled by one sovereign prince are marshalled together quarterly or otherwise in one escatcheon; and it has been the practice of many sovereigns to marshal along with their own arms of dominion, arms of territories of which they are not in pessession, but to which they claim a right. Thus, England bore the arms of France from the time of Edward 111. till 1801; and the kings of Naples and of Sardinia were in use to bear the arms of Cyprus and of Jerusalem. Similarly it has been the practice of the Dukes of Athele and Earls of Derby, as having been lords of Man, te quarter the arms of that island; and fendal coats are horne

quarterly and *en surtout* by various peers of Scotland. As to honourable additions to arms granted by sovereigns, see Augmentation.

by sovereigns, see Augmentation. While family amos transmit in the male line to the descendants of the heaver of them, to be bone by eadets with recognised differences, an heiress in the heraldic sense—i.e. a daughter who represents her father, conveys her mins to her husband (provided he he himself a gentleman of coat-amont) to be marshalled in accordance with certain rules with his own. Occasionally the arms of a great heires are allowed altogether to supersede the paternal coat; and sometimes a successor who is a stranger in blood bus been empowered to assume adoptive arms to fulfil the wish of a testator.

Heraldry is thus, in one of its aspects, a faithful chronicler of the bistory both of royal dynasties and of pivate faudlies. Every change in the hereditary succession of a kingdom, every union of two houses by marriage, occasions a corresponding change in the coat-of-arms; the position which the members of a house occupy in the family tree is duly indicated, and an armorial shield is thus a record whose nice distinctions indicate to all who understand its language, a number of material facts regarding the owner of it. Heraldry is in this way an aid to the study of history, general and local It has often afforded the key to questions of disputed succession; and seally, baronial and monumental carvings, and shields in church windows, have all been recorded in courts of hw as evidence in obscure questions of marriage and descent.

The Shield.—A cont-of-arms is composed of charges depicted on an escatcheon representing the old knightly shield. The word 'escatcheon' is derived from the French (crosson, which signified a shield with arms on it, in contradistinction from a shield generally. The forms of the shield represented in horaldry, as in war, differed at different times. The actual shields of the 11th and 12th centuries were in shape not unlike a boy's kite.



They were curved to encircle the bedy, and in some early scals are so represented; but, after horaldry began to be systematised, we generally find them engraved on scals and monuments as if llattened, to let the armorial design be fully seen. The pear-shape (1, fig. L) represented in a few early shields, was soon followed by the flatirum or heater-shape (2), which prevailed in the 12th and 13th conturies, with an increasing tendency to imple towards the base, more especially after the introduction of the practice of quartering. When helmet, or belief and crest, were represented, the shield was often placed in the position called coache (3), as if suspended from the end of the 15th century appeared such forms as 4 and 5, where the notch is meant to represent a rest for the knightly lance. In the 16th century the forms used became more florid (6), but with considerable variety. The forms in use in the 17th and still more the 18th century, became

gradually more and more tasteless and numeaning the least offensive being perhaps the vair-shaped shield (7). In France and Germany the shield most in use is very wide at the lase, so as to afford sufficient 100m for the display of quarterings or small charges. In Spain the favourite type of shield has always been one with rectangular sides and a segment of a circle for the base. shield of an unmarried lady or widow is of a lozengeshape (8)

To facilitate the description, or as it is called blazoning of arms, the different points or positions

١ĸ E н

on the escutcheon have received technical names. English heralds generally enumerate them as nine: A (fig. II.), the dexter chief point: B, the middle chief; C, the sinister chief; D, the honour or collar point; E, the fess point; F, the nombril or navel point; G, the dexter base; H, the middle base; and I, the

Fig. II sinister base point. To these may be added K, the dexter flank, and L, the sinister flank. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation to the supposed bearer of the shield, not of the spectator.

Tinetures. - Coats of arms are distinguished from each other not only by the charges or objects borne on them, but by the colour of these charges, and of the field itself. The field may be of one colour, or of more than one, divided in various ways to be noticed below, *Tincture* is the more proper armorial expression than colour, as the surface of a shield or of an armorial figure may be of a metal, or a fur, as well as of a colour strictly so called.

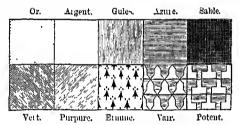


Fig. III.-Tinctures.

The nomenclature of these three classes of tinctures, as of heraldry generally, is an adaptation of Norman-The metals in use are two-gold, termed or, and silver, urgent, often represented in painting by yellow and white. The colours are five-red, blue, black, green, and purple, known as gules, azure, subte, vert, and purpure. A charge represented not of any of these conventional heraldic tinetures, but of its natural colour, is said to be proper. In uncoloured heraldic engayings, it has been found convenient to have a mode of representbeen found convenient to have a mode of representing colours and metals by hatched lines and dots, which is shown in fig. III.; an invention not older than the 17th century. Or is represented by dots; for argent, the field is left plain; yules is denoted by perpendicular, and acure, by horizontal lines; sable, by lines perpendicular and horizontal crossing each other; vert, by diagonal lines from device this to shipter have and unit lines from dexter chief to sinister base; and purpure, by diagonal lines from sinister chief to dexter base. The original furs in use were crmine and The former is represented by black spots resembling those of the fur of the animal called the ermine, on a white ground. Vair, said to have been taken from the fur of a squirrel, bluish-gray on the back, and white on the belly, is expressed (at

least in the more modern heraldry) by blue and white hells or panes in horizontal rows, as shown in the figure. As the number of coats increased, various modifications of these fins were introduced, including craines, or emine with the field black and the spots white; crownors, with the field gold and the spots black; crownors, with a red hair on each side of the black spots; pran, with the field black and the spots gold. Potent is a crutch shaped form of vair, as represented in the figure, and it also has occasional varieties which need not be noted at length. When vair is composed of any other tinctures than argent and azure, it is blazoned rerry of these tinetines, and is more strictly a field

divided by partition-lines than a fm.

Charges .- Everything depicted on the field of the escutcheon is called a charge, and is supposed to stand out in relief on it; and as a general rule, a shield-of-arms has one or more charges. exceptional cases occur in continental heraldry of an uncharged shield of one of the metals, colonis, or fms; and even in British heraldry there are, as will be seen, cases where a field consisting of metal and colour divided by partition-lines is uncharged. It is an established rule of heraldry that metal A remarkable transgression of it occurs in the arms of the kingdom of Jerusalem founded by the Crusaders, which are argent, a cross potent between four crosses or. A recognised exception exists wherever a charge lies over a field partly of metal wherever a charge her where an animal is (see infia) anned, langued, attited, unguled, beaked, membered, crowned, collated, or chained of a different functure from that of his body. One charge of colour may surmount—i.e. partly cover, another of colour on a field of metal, and the same may happen in case of two charges of metal on a field of colour.

Armorial charges are usually divided into three classes: (1) Honomable ordinaries, figures of simple ontline and geometrical form, conventional in character, which in some of the oldest coats are the only charge; (2) Subordinaries or subordinate ordinaries, which differ from the above chiefly in the convention of the ordinaries of the convention of the con not being generally the recipients of charges, while honourable ordinaries may be and often are charged; (3) Common charges, representations of

objects of all kinds, animals, plants, and the whole range of things natural and artificial.

Ordinaries.—The enumeration of the honourable Ordinaries.—The enumeration of the honourable ordinaries by different armorialists is not absolutely identical, some classing as subordinaries figures which others regard as belonging to this class. It may be predicated generally of the ordinaries that they may be borne either simply, along with other charges, charged with other ligures, bounded by any of the forms of irregular partition-lines to be uoticed below, or combined with each other. Also that they have in most cases their diminutives, which (except in the case of a canton as the diminutive of a quarter) cannot be charged. ing as our test for admission to this more honourable class the capacity of receiving charges, they may be accounted thirteen in number:

The Chief (1, fig. IV.1, lying horizontally along the upper part of the shield, and (as also the Pale and Fess) supposed to occupy a third of it. The Pale (2), a vertical band in the middle of a shield. It has a diminutive, the Pallet, seldom used singly, and a smaller diminutive, the Endorse. The Fess (3), a horizontal band in the middle of the shield. The Fess The Bar is a narrower fess, never used singly, and there are further diminutives, the Closet and Barrulet. The Bend (q.v.) (4), a hand crossing the shield from dexter chief to sinister base; when charged it occupies one-third, and when plain one-fifth, of the field. It has for diminutives the

Bendlet, the Cotise or Cost, and the Ribbon. The ribbon is sometimes comped or cut short so as not to touch the edges of the shield. The cotise sometimes accompanies the bend in pairs on each side, when it is said to be *Colised*, and the same term is sometimes applied with less propriety to a fessor chevron accompanied by a pair of its diminntives. The *Bend-sinister* (5), a band crossing the shield from sinister chief to dexter base. Its diminntive, the *Baton-sinister* (q.v.), couped, and borne over all is a mark of illegitimacy. The *Chevron* (6), a figure composed of two lands or limbs issuing from dexter and sinister base, and meeting about the bonour point. Its diminutives when it is said to be Colised, and the same term meeting about the honour point. Its diminutives are the Cherronel, which never appears singly, and the Couple-close, which sometimes accompanies the chevron in pairs, one on each side. The Cross (7), of the form of the Greek cross, with equal limbs.

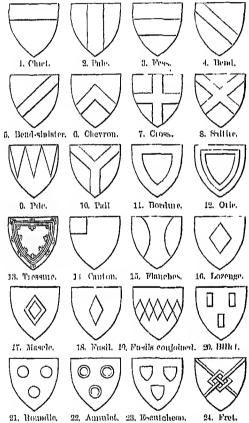


Fig. IV.-Ordinaries and Subordinaries.

It has munerous varieties, most frequently borne in numbers or with other charges, for which see Cross. Any of them is said to be fitcher when its lower limb terminates in a sharp point. The Saltire (S), a St Andrew's Cross, or combination of the bends dexter and sinister, often home along with a chief in the heraldry of Scotland. The Pile (9), a tri-angular wedge-shaped figure, issuing usually from the chief with point downwards. Three piles are often home together. The Pall (10), the upper part of a saltire combined with the lower part of a pale. A variety of it, couped and pointed at the extremi-The Bordine (11), a border surrounding the shield, sometimes used as a principal figure, sometimes as a difference. The Orle (12) and the Tressure (13) are sometimes classed as its diminu-

tives. The former is a narrower bordure detached from the edge of the shield. The latter, borne double and flowered and counterflowered with Henrs-de-lis, occurs in the royal shield of Scotland. Henrs-de-lis, occurs in the royal shield of Scotland, and is a bearing greatly esteemed in Scotlish beraldry. The *Quarter* is the upper dexter fourth part of the shield, cut off by a vertical and a horizontal line meeting in the fess point. The *Cunton* (14), of more frequent occurrence, is a smaller figure like it, and also in dexter chief, unless otherwise specified. The half of a canton parted per bend is called a *Gyron*, chiefly known in British heraldry as giving its name to the field

parted per bend is called a Gyron, chiefly known in British heraldry as giving its name to the field Gyronny. Flanches (15), borne in pairs, are projections from each flank of the shield bounded by a segment of a circle. Their diminutives are Flasques and Voiders.

Subordinaries.—The subordinaries (excluding those here included in the category of honourable ordinaries) are: The Lozenge (16), a rhombus with the acute angles at top and bottom. The Muscle (17), a lovenge deprived of the middle part. The Fusal (18), an elongated lozenge. Several fusils are sometimes compoined on fess (19), as in The Fusal (18), an clongated lozenge. Several fusils are sometimes emploided on fess (19), as in the coat of Percy. The Billet (20), an oblong figure placed perpendicularly. The Romale (21), a circular disc of knob. Romales have, in English heraldry, specific names in respect of their time tures. A roundle or is called a Berant; argent, a Plate; gules, a Tortean; suble, a Pellet or Ogress; vert, a Pomme. The Annulet (22), sometimes regarded by armorialists not as a ring but as a pierced roundle. The Escatcheon or Inescutcheon (23), a representation of a shield—the latter name being generally used when there is only one. It being generally used when there is only one. It being generally used when there is only one. It is difficult to see on what principle these last two charges are conventional enough to be ranked among the lesser ordinaries. The Fret (24), consisting of two partow hendlets dester and sinister in saltire, interluced with a mascle.

Parted Fields.—The field of an escutebeou (and sometimes an ordinary or other charge) may be of two or more different tinctures, divided by

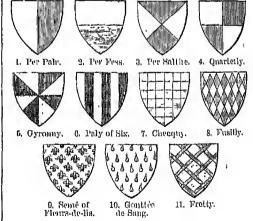


Fig. V.—Parted Fields.

one or more partition-lines, and the consideration of partition-lines has here been postponed to this point, as the nomenclature of many of them is derived from that of the ordinaries and subordinaries. When divided by a partition-line in the direction of one of the ordinaries the shield is said to be per pale (1, fig. V.), fess (2), bend, cherron, or saltire (3). A shield divided in the direction of a cross is said to be quartered or parted quarterly (4); parted both per closs and per saltine it is called Gyronny of eight (5), the well-known heaving of the Campbell family. A shield divided into any number of parts by lines in the direction of a pale, bend, bar, or eberron, is said to be Paly, Bendy, Barry, or Chevronry, the number of pieces being specified, as in the example (6), paly of six or and sable (Athole). A field divided into square or ablong panes or pieces by vertical and horizontal lines is said to be checing, as the ancient coat of Warren, cheeping or and agure panes (7). A field divided into lozenge-shaped, mascle-shaped, or first-shaped panes is described by the term lozengy, mascolly, or fusilly. Fusilly argent and gules (8) is the coat of the Grimaldis, princes of Monaco.

A field strewed with an indefinite number of small charges so as to produce the effect of a pattern is said to be semé (sometimes aspersed or powdered) of that charge, as France ancient, azore, seme of fleur-de-lis or (9). When bestrewed with an indefinite number of bezants, billets, cross crosslets, or drops, it is called bezonty, billetty, crusilly, or gonttee. English heraldry attaching a specific term to drops of separate tinctures-i.e. gouttee l'ean (water, tinetured argent), de sang (blood, gules, 10), de larmes (tears, azure), de poix (pitel, sable), &c. Frity (11) is when a field is covered with a pattern of interlaced fillets placed diagonally, and leaving open spaces between them.

Partition-lines are not always straight.

I. represents the communest forms regular partition-lines in Engrailed. nse –viz. the engrailed, inrecked, wary, nebulé, embuttled, indented, and dancetté, names equally ----- Invected

applicable to the boundary-

points of the engrailed line

turned outwards, and an ordinary invecked inwards.

When a fess or chevron is

said to be embattled, it is

lines of ordinarics. ordinary engrailed has the

∕~Wavy. ZZZZZ Nebule. TIP Embattled.

VVV Indented. Dancetté.

Fig. VI. sand to be embattied, it is only the boundary-line on the niper side that is of this form. Dancette differs from indented by the

partition-line having larger and fewer indentations.

Common Charges.—These are representations, more or less conventional, of familiar objects. The knights, in the early days of heraldry, ranaeked the animal and regetable kingdom and the whole range of objects, natural and artificial, for charges that would be distinctive; of which only a few of the most frequent, and those whose nomenelature or treatment is somewhat technical, can be here

noticed.

Of heasts which occur in coat-armour, the most important, both in earlier and in later heraldry, is the Lion. Its earliest known occurrence is on the seal of Philip I., Dake of Flanders, in 1164; and before long the king of beasts was horne by a large number of the potentates of Europe. The long is made to assume a variety of positions, a few of which are represented in fig. VII. Its original and normal attitude is rampant (1)-i.e. in an erect position with the left hind-leg resting on the ground, the head in profile, and the tail elevated over the back. Rampant gardant (2), the same with the head affrontee (looking out of the shield); regardant (3), the same looking backwards. Passant (4), walking, three paws resting on the ground, the dexter forepaw elevated, the head in profile looking forward, and tail elevated over the back; passant gurdant (5), as the last, but with the head affrontee. A lion salient (6) has both hind-legs on the ground, and the fore-legs elevated, as if to

spring; and a lion separt (7) is rising to prepare for The lion passant gardant is often blazoned as the lion of England; and in times when terms of blazomy were comparatively few, it was known as the leopard; there has, in fact, been much controversy as to whether the animals in the escutcheon of England are lions or lempards. Two headed, bior Engand are nons or tempards. Two-headed, in-corporate, and tri-corporate lions occur in beraldry, as also lion-dragons and lion-poissons. There is likewise the celebrated winged lion of St Mark adopted by the republic of Venice, and the two-tailed lion of Bohemia and of Simon de Montfort, Earl of Leicester. In British heraldry lions and other animals always face to dexter unless otherwise blazoned. Two lions placed face to face are called combatunt, and back to back, addosse. Some of the above-mentioned names for the attitudes of the lion are applied to other headdir animals. Lions and other beasts of prey are said to be armed or langued of any tincture, when their teeth and claws or their tongue are of that tinetme, and in modern English blazon a lion is always pre-sumed to be armed and langued gulrs unless either himself or the field be gules, in either of which eases he is armed and langued azure. A demi-lion (8) is the upper half of the body of a lion with the extremity of his tuited tail. Lions are often enouncd, or goiged (colland) with a crown of some sort. Bears, bulls, boars, stags, goats, dogs, foxes, horses, and hedgehogs, and occasionally dephants, earnels, nucles, apes, bats, and mice occur as heraldic animals. A stag when in easy motion is said to be trippant (9); he is at gaze (10) when a lion would be statant gardant, and he is attired of any tincture when his attires—i.e. his antiers, are of that tincture. Animals that possess home and hoofs are said to be armed and unguled in respect of them. The heads and limbs of animals are often borne as charges, and may be either crascal, like the lion's head (11) —i.e. cut off with a jagged edge; or couped (12)—i.e. cut straight off. A leopard's face (13) shows none of the neck, and fronts the spectator. A stag's head borne full faced, with none of the neck seen, is said to be cabossed (14). Boars' heads (15) are not unfrequent, and bears' heads (16), which are usually represented nunzzled. Animals in heraldry sometimes assume a conventional form differing widely from the realistic type of the same creature—e.g. the antelope, which has a stag's head, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck, and similar tufts on the tail, chest, and thighs.

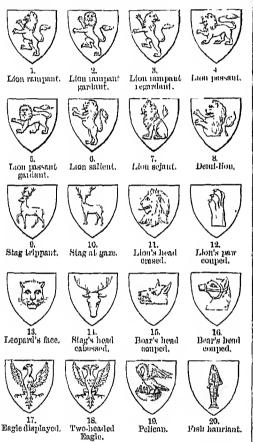
Among hirds, far the most prominent is the Eagle q.v.), most commonly represented in the conventional attitude known as displayed (17), with wings expanded. Being the king of birds, it became, next to the lion, the most favourite bearing of royal personages, and was adopted by the German emperors. The imperial eagle had at first but one head; the two-headed eagle (18) appeared in the middle of the 13th century, and occasionally occurs in English heraldry. The allerion and martlet, originally an eagle and a swallow respectively, became in time unreal birds, the one without claws or beak, the other without legs or beak. The falcon, the pelican, the swan, the cock, the raven, the ostrich, the heron, and the parrot or papingoe are all armorial birds. The pelicon is generally depicted pecking her breast, and when represented in her nest feeding her young with her blood, she is said to be in her piety (19). A peacock borne affrontee with his tail expanded is said to be in his mide. Birds having the power of flight are, in respect of their attitude, close, rising, or rolant.

Fishes and reptiles occur as charges; the former are said to be naiant, if drawn in a horizontal, and hauriant (20), if drawn in a vertical position.

The dolphin, whom naturalists do not acknowledge as a fish, is in heraldry the king of fish, and is very conventionally drawn most usually embowed (21)—i.e. with the body hent. It is hest known in this attitude as the allusive bearing of the dauphin. The escallop shell (22) is a favourite charge, having been the pilgrim's ensign in crusading times. Serpents occur in various attitudes, bowed, erect, &c., and in one famous instance (the coat of the Visconti) varant (devouring) a child (23).

Of purely fantastic animals, we have the dragon, griffin, wyvern, cockatrice, unicorn, mermaid, and

otheis.



Man in whole and in his parts also occurs in armory. Argent, a naked man proper, is the coat of the Scottish family of Dalzell, and we have Moors' (generally represented as blackamoors) heads, Saracens' heads, men's hearts, arms, legs, and hands, also that strange heraldic freak, the three legs conjoined (24), carried in the escutcheon of the lele of Man.

To pass to the vegetable kingdom, trees, plants, leaves, and flowers are all usual heraldic charges. Trees are often eradicated (25), or torn up by the roots, sometimes placed on a mount (26), and occasionally fructrated of a different tincture. Garbs (27), representing sheaves of wheat, are well known

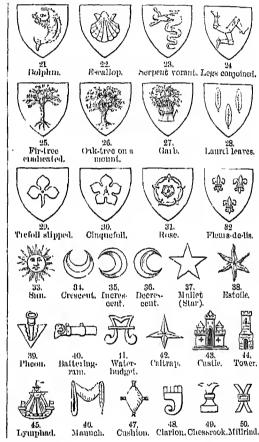


Fig. VII.—Common Charges,

as the arms of the Earls of Chester, of the Grosvenors, and of the Scottish family of Cumyn. Leaves, as of the leaved, are often borne, like many other charges, in threes (28). A trefoil, with three leaflets and a stalk, is said to be slipped (29); in the quatrefoil and cinquefoil (30) the syllable foil means a petal. The rose (31) has obtained a prominence in English heraldry from having been the badge of the rival houses of York and Laneaster, and in the conventional representations of it, it has five petals, barbs between them to represent the calyx, and seeds in the centre. It is generally without a stalk, its tincture being either gules or argent, and it is usually barbed and seeded proper—i.c. the barbs are green, and stamina yellow or gold. But of the floral devices of heraldry the most famons is the fleur-de-lis, generally identified with the iris, adopted as a badge by Louis VII. of France in 1150, and borne by his son in the form of semé

of fleurs-de-lis (9, fig. V.), which became the royal coat of France, till the flowers were reduced to three in number in the reign of Charles VI. (32).

Such charges as swords, scimitars, bows, arrows, helmets, hattle-axes, horseshoes, mitres, crosiers, &c. explain themselves. The stra surrounded by rays is said to be in his splendour, and generally has a human face (33). A crescent (34), representing the moon, has both horns pointed apwards. If the horns are turned to dexter it is called an increscent (35); if to the simister a decrescent (36). The five-pointed star (37), in the heraldy both of the Continent and of Scotland, represents the heavenly body so called, though not distinguishable from the mullet or spur-rowel, except that the latter is sometimes pierced. In modern Englishheraldry this figure is always styled a mullet, and the estoile (38) or star has six or more wavy points. A pheon (39) is the head of a dart

barbed and engrailed on the inner side. A battring-ram (40) is furnished with an actual ram's head. A water-budget (41) represents the bags in which water was stored up and carried across the desert in ernsading times. Caltraps (see CALTROP) or chevaltraps (42) are military instruments for galling the feet of horses. Castles (43) and towers (44) are not unfrequent, the former very generally triple-towered. An ancient one-masted galley, called a tymphad (45), is characteristic of the West Highlands of Scotland. Of charges derived from dress one of the most remarkable is the manuch (46), a 12th-century sleeve, borne by the Hastings family. Cushians (47) have become famous in Scotland from being borne by Bruce's gallant nephew, Randolph or Rannlph, Earl of Moray, and his descendants. The clurion (48) or war-trump is an early English bearing. The chessrook (49) or eastle in chess is somewhat conventionally drawn. The millrind (50) is the iron affixed to the centre of the millstone.

Like medieval architecture, heraldry attained its greatest beauty and purity in the 13th century and first half of the 14th. From that date its early simplicity was gradually departed from: a variety of charges came to be accumulated in one shield, and there was a growing tendency to pictorialism. Trees are represented issuing out of a mount or little green hillock in base (20), and we have also animals walking on a base—i.e. a line entting off the lower part of the shield. In Wales we have combinations such as a cradle with a child under a tree gnarded by a goat, and sometimes in Spain and Italy two animals rampant against a tree, or such scenes as a bloodhound in the act of strangling a boar, or a scrpent vorant a child (23). In the second half of the 18th century the heraldry of England entered on a singularly degraded and debased stage, far beyond the pictorialisms alluded to, shields being loaded with representations of sea-fights, fortresses, and landscapes, with medals and decorations granted to the bearer of them, setting all heraldic conventionalities at defiance, and dealing in details hardly discernible on the closest inspection. Such charges were habitually granted by way of chiefs of angunentation to the heroes of the old wars. It is to be hoped that the revival of a measure of taste in coat-armour has put an end to them for ever.

Bluzonry, -To blazon a coat-of-arms is to describe it in words so precise as to enable any one who has an ordinary knowledge of heraldry to depict it correctly. The following are the principal rules of The field must first be named; it may blazoury. blazoury. The field must first be named; it may be of one thecture, or an arrangement of more than one (see ante-Parted Fields). The charges follow, beginning with those of most importance and nearest the field, their name, number, position, and tincture. An ordinary or a diminitive of an ordinary, except it be a chief, bordure, or canton, generally claims the precedence. When the wincipal charge is not in the centre of the the principal charge is not in the centre of the shield, its position must be described, as De Vere, Earl of Oxford (fig. VIII. 1), quarterly gules and or, in the first quarter a star (mullet) argent. When two or three of the same charge occur, it is understood, unless otherwise specified, that two are placed in pale—i.e. one over the other; and three are disposed, two above and one below; and it is also understood that in case of a fess or a bend between six charges of the same kind, there are three in chief and three in base. In other cases the disposition of the charges must be specified, as in bend, in cross, in saltire, in orde; three, two, and one: four. three, two, and one, &c. If the ordinary, one; four, three, two, and one, &c. If the ordinary, which is the principal charge, be itself charged, and there are also other charges in the field, the order of the words of blazon will be understood by

the following example—Wilmot, Earl of Rochester (2), argent, on a fess gules, between three eagles' heads erased sable, as many escallops or. An exception to the rule that an ordinary or its diminutive is first named, occurs where it debruises or surmounts another charge—e.g. Abernethy (3), or, a lion rampant gules, surmounted by a ribbon

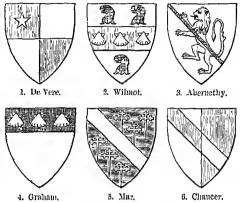


Fig. VIII.—Blazonry.

sable. Generally speaking, a chief, bordure, or canton is mentioned last. When a bordure surrounds a chief, the bordure is named last of all, the reverse being the case when the chief covers the bordure. A bend may surmount a chief, in which case it is mentioned last.

Avoidance of repetition is one of the principles of blazonry. When any tincture has to be repeated, it is on the second occasion described as of the first, of the second, of the last, or of the field—e.g. Graham (4), or, on a chief sable, three escallops of the field. Repetition may also be avoided by naming the tincture only the second time—e.g. Mar (5), azure, a bend between six crosslets fitched or, where the tincture or applies to both bend and crosslets.

When the field is of a metal and colour separated by any of the lines of partition, and the charge on it is said to be counterhanged, this means that the part of the charge which is on the metal is of the colour, and vice versa, as in the coat borne by the poet Chancer (6), per pale, argent and gules, a bend counterchanged.

Differencing.—With the advance of the science of

Differencing.—With the advance of the science of arms it became necessary not only to distinguish different families, but to distinguish the different members and branches of a family from each other and from their chief. The head of the house had alone the right to use the pure paternal coat; the cadets had to wear it with a brisure or difference. There is great variety in the early brisures. A change of tincture, the substitution of one ordinary for another, the debruising of the paternal coat by a bend, the surrounding the arms with a bordure, uncharged or charged, and the addition of part of the coat of an heiress, were all in use as modes of differencing. The differenced coat became an independent heraldic composition, sufficiently like the original arms to indicate the family to which its owner belonged, and also often suggestive of events in the history of the cadet line.

the original arms to indicate the family to which its owner belonged, and also often suggestive of events in the history of the cadet line.

The name of marks of cadency has been given to certain small figures which, by a conventional arrangement, indicate the order of descent of the different sons of a family. As systematised about the reign of Henry VII., and in use in modern English heraldry, the marks of cadency are, the label (1, fig. IX.) for the eldest son, the crescent (2) for the second, the mullet (3) for the

third, the martlet (4) for the fourth, the annulet (5) for the fifth, the flour-de-lis (6) for the sixth, the rose for the seventh, the cross moline for the eighth, and the octofoil for the uinth. The difficulties are obvious of carrying out a system of this kind through all the ramifications of a family for successive generations, even by such devices as charging a crescent with a mullet for the third son of a second son, &c., and the consequence of the super-session in England of all other differences by these figures has been that differencing is much neglected, and remote callets are often found bearing the arms of the head of their house undifferenced. the sons and daughters of the royal house of the United Kingdom another usage prevails. They all bear their arms differenced by a label of three points argent. That of the Prince of Wales is plain, those of the younger princes are variously charged.









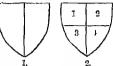
Crescent, Mullet. Martlet, Anualet, Fleur-de-lis, Label. Fig. IX. -Marks of Cadency.

The label of the Duke of Edinburgh is charged with a St George's cross in the centre point, and in each of the other points with an anchor azure. The Duke of Companish substitutes for the anchor a fleur-de-lis azure, and the Duke of Cambridge

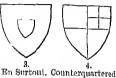
two hearts in pule gules. In Scotland, owing perhaps to the wider ramifica-tion of the principal fendal families, differencing has been considered of more moment, and is the subject of a separate treatise by the Scottish herald t. The modern marks of cadency are less in The modification of the paternal coat by an Nishet. additional charge, the engrailing, invecking, &c., of a chief or a partition-line has never fallen out of use. Differencing by a bordure has also been much in favour, a plain bordure of the tineture of the principal charge in the case of a second son, which inay be engrailed, invecked, wavy, &c., for cadets branching off in the same generation, and for subcadets, parted in different ways, or charged with figures from the maternal coat. With eadets of a later generation the hordures will be of a different eolour. Some such system, more or less rigidly observed, must through the differencing of Scottish coats, which is under the direct supervision of the Lyon Office. For difference designed to illegitimate children, see BATON-SINISTER.

Marshalling of Arms.—Marshalling is the proper arrangement of such conts as are to be combined in one shield. In the earlier heraldry it was not the practice to exhibit more coats than one on a shield, but the arms of husband and wife were sometimes placed accollée, or side by side in separate esentcheons; or the principal shield was surrounded by smaller ones, containing the arms of maternal andescent or marriage indicated by the addition of some bearing from the wife's or mother's shield. Then followed dimidiation, when the shield was parted per pale, and the two coats placed side by partied per pale, and the two coats placed side by side, half of each being shown. By the more modern practice of impairing (1, fig. X.), the whole of each coat is exhibited, a reminiscence, however, of the older practice being retained in the omission of bordness, and occasionally tressures, on the side bounded by the line of impalement. The most common case of impalement in English heraldry is where the coats of hasband and wife are consisted the bushess's area converand wife are conjoined, the husband's arms occupying the dexter side of the shield, or place of honour, and the wife's the sinister side, the impaled coat being personal, and non-descending to the children.

The arms of states are sometimes impaled, as were those of England and Scotland in the first and fourth quarters of the achievement of Great Britain from the accession of Queen Anne to the Irish Union. Bishops, deans, heads of colleges, and kings-of-arms impale their arms of office with their family coat, giving the dexter side to the







Impaled. Quartered. Fig. X,-Marshalling of Arms.

former. This practice in Scotland, as far as bishops are concerned, belongs only to the post Restoration epis-copacy, as the Scottish sees had no arms till then.



Quarterly

The husband of an heiress (in the heraldic sense) is entitled, according

to the more modern usage of British heraldry, to place her arms on a small shield, called an escutcheon of pretence, in the centre of his shield, instead of impaling, and in the next generation the arms of the houses are transferred to one of the quarters of the shield. The escutto one of the quarters of the shield. The escut-cheon of pretence is, however, not to be cen-founded with a small shield of the same kind, called an escutcheon en surtout (3), much in use in German, Freuch, and Scottish heraldry, which takes a permanent place in the achievement, and may contain either the paternal arms (as in the Tweeddale branch of the Hay family), some feudal coat, or the coat of an heiress in some past generation, whose memory it has been thought desirable to preserve. It has been the practice for an elected king to place his arms in an escutcheon en surtout, the old German emperors placing their family arms on the breast of the imperial eagle.

Quartering, or the exhibiting of different coats on a shield divided both horizontally and vertically, originated in the 13th century, but was little practised till the 14th. The divisions of the shield practised till the 14th. The divisions of the shield are called quarters, and are numbered horizontally, beginning at the dexter chief (2). Arms are quartered on various accounts: (n) To indicate dominion. A sovereign quarters the ensigns of his different states. On the temb in Westminster Abbey of Eleanor, daughter of Ferdinand III., king of Castile and Leon, and first wife of Edward I., is the paternal shield of that princess, in which he eastle of Castile occupied the list, and fourth the eastle of Castile occupied the first and fourth quarter, and the lion of Leon the second and third. The received rule regarding the quartering to the most ancient, unless it be of inferior importance. The kings of England, owing to their supposed claim to the French throne, long bore France in the first and fourth quarter, and England in the second and third. In the arms of the United Kingdom, as now borne, England occupies the first and fourth quarter, Scotland the second, and Ireland the third—the relative positions, however, of England and Scotland being reversed on the official seals of Scotland. Feudal arms are sometimes quartered by subjects. of the peers of Scotland bear arms of this description. (b) Arms of angmentation or special con-ecssion accorded to a subject by his sovereign by eession accorded to a singlete by his societies may of honour, are sometimes granted to be borne quarterly with the paternal coat. These sometimes include a portion of the royal insignia, and have precedence of the paternal coat. (c) The have precedence of the paternal coat. (c) The most usual reason for quartering is to indicate

descent from an heiress who has married into the Where there is but one heiress, her coat family. occupies the second and third quarters of the shield, and the paternal arms the first and fourth. When there are more than one, they are marshalled in the successive quarters in the order of the inter-marriages. Where more than four coats have to be marshalled, the number of vertical lines is increased, and the divisions, though more than four, are still called quarters (5). Where there is an old number of coats, the last quarter is usually filled up by repeating the first. One of the quarters may itself be quartered, when the heiress was may itself be quartered, when the heress was entitled to bear a quartered coat: the shield is then said to be counterquartered (4), and its primary quarters are called grand guarters. In the course of generations a shield may thus sometimes be inconveniently crowded by the accumulation of coats, including the coats to which each heiress may, in a similar way, have become entitled; and in Germany sometimes above twenty coats (generally coats of dominion) are found marshalled in one esentcheon; but, in are found marshalled in one escutcheon; but, in British heraldry, families entitled to a number of quarterings usually select some of the most important. A quartered coat may be surrounded by a bordure (for difference), in which case it is treated as one coat.

In the heraldry of the Highlands of Scotland, which is not older than the 16th century, a system of quartering prevailed quite irrespective of family alliance, the quarters being changed under different modifications, with figures partly borrowed from the old monumental sculpture of the country, including the engle, the fish, the hand with the red arms and the one-mosted calley of Larrie.

cross, and the one-masted galley of Larne.

The expression 'quarterings' is sometimes loosely used for descents in cases where there is no right to quarter from representation. The eight or sixteen quarterings which in former days were on the Continent essential for the holder of nearly every public office, which were, till lately, often found ranged round the Scottish funeral esentcheon, and which are still important for many purposes in Germany and Austria, have no reference to representation, but imply purity of blood for four or five generations—i.e. that the father and mother, the two grandmothers, the four great-grandmothers, and also, in the case of sixteen quarterings, the eight great-great-grandmothers, have all been entitled to coat-armon.

Other modes of marshalling are in use on the Continent, as the division of a shield per saltire, or into three parts. The marshalling of a coat en pointe, or on a triangular ligure issuing from the base of the shield, used to be familiar from the escateleon of Hamover, borne first in the fourth quarter of our royal achievement, and afterwards en surtout, where we have Brunswick impaled with Lüneburg, Saxony in base, and over all the crown of Charlemagne, as belonging to the office of arehtreasurer of the empire.

External Ornaments.—Over and above the shield of arms there are certain accessories in use to be represented along with it, and which together with it constitute an achievement of arms. These include the helmet, the crest, the motto, the mantling, the supporters, and the crown or cornect.

Before the beginning of the 14th century a belinet began to be placed above shields of arms, the shield being represented in the position called conchéc—i.e. suspended from the suister chief angle. After the conchée attitude was abandoned, the helmet resting on the shield began to vary according to the rank of the bearer, the forms adopted being both unbecoming and fanciful. The following are the forms in use in

modern British heraldry: (1) that assigned to the sovereign and royal family, which is full faced, of gold, lived with crimson, and with the visor divided by six projecting bars; (2) the helmet of peers, exhibited in profile, with tive bars, of which three or four are shown. The helmets of dukes and



Fig. XI.—Helmets.

marquises are entirely of gold, those of earls, viscounts, and barons of steel, with the bars of gold; (3) the belinet of baronets and knights, of steel, full faced, with the visor thrown back, and without bars; (4) the helmet of esquires and gentlemen, in profile, of steel, and with the visor closed. A helmet is never placed over the arms of any woman except the sovereign.

The Crest (q.v.) is an ornament of the head rising above the helmet. Crests first appear occasionally on seals and monuments of the 13th eentury, the earliest heing a radiant ornament somewhat like a displayed fam. Originally a special mark of honour worn by heroes of great valour or holding a high military command, the crest became eventually, in English heraldry at least, an inseparable adjunct of the coat-of-arms. An extraordinary number of crests are sometimes accommlated in German achievements, each on its separate helmet. In our modern heraldry the crest is generally placed on a wreath of two pieces of silk of the livery colours—i.e. the first metal and first colour of the shield, but occasionally on a cap of maintenance or a dueal coronet. In the achievement of the sovereign the helmet is placed immediately above the shield, the crown rests on the helmet, and the royal crest rises from the crown. In the achievements of peers, on the other hand, the helmet rises from the coronet, which is placed immediately over the

The motto is placed within an escrol either over the crest or below the shield. It bears in many cases an allusion to the family name or arms, or to the crest.

The mantling or lumbrequin is an appendage hanging down from the helmet and passing behind the escatchen. It is considered to be derived either from the eentoise, an ornamental scarf represented in seals and monuments of the 13th and 14th centuries, or from the utilitary mantle or robe of estate. Its comparatively irregular shape in more modern instances has been explained as indicative of the tattered condition to which it has been reduced in the field of battle. Tassels are sometimes appended, and when treated as a robe of estate the bearings of the shield are occasionally repeated on it. In British heraldry the mantling, of the sovereign is of gold, lined with ermine; that of peers of crimson velvet, lined with ermine. Knights and gentlemen have either the livery colours of the shield, or, as the practice is in Scotland, crimson velvet lined with silver.

The Grown (q.v.), Coronet (q.v.), and Mitre (q.v.) are adjuncts to the shields of those whose dignity or office entitles them to be thus distinguished.

Supporters.—These figures placed on each side of an armorial shield, as it were to support it, were at first purely decorative, generally, however, having allusion to the arms or descent of the hearer; but they soon eame to be considered indicative of his being the head of a family of eminence or distinction. The most usual supporters are animals,

real or falmlous; but men in armour are not unfrequent, as also naked men or savages, often carrying chils, and wreathed about the head and middle. On early seals a single supporter occasionally occurs, and there are instances of the escutcheon being placed on the breast of an eagle displayed. The dexter and sinister supporters are often, and almost always in continental heraldry, alike. In British heraldry, however, the two supporters are in many cases different; and where the bearer represents two families, a supporter is sometimes adopted from the achievement of each. The rules restricting the right to supporters are different in different combries. In England their use is confined to the royal family, peers, knights of the Garter, and knights Grand Cross of the Bath (with the last the right does not transmit to descendants), the heads of a very few families out of the peerage, who derive their right from an old patent or early usage, and the chief mercantile companies of London. In Scotland the right extends to the chiefs of important chars, and the representatives of minor barons who had full baronial rights prior to 1587, the date of the act which limitly excluded the minor barons from parliament. Baronets of Nova Scotia have as such no right to supporters, though many of them bear them in respect of their baronial qualifications. It is considered to be in the power of the Scottish King-of-arms to confer them expressed, except for the period between 1790 and 1820.

Any collar and badge of an order to which the heurer may have a right forms properly a part of his achievement, the collar surrounding his shield, and the badge being suspended from it. The badge of Nova Scotia is suspended by an orange-tawny ribbon from the shield of baronets of Scotland; and other baronets have the arms of Ulster in a canton or an inescutcheon (see BARONET). Certain officers of state accompany their shields with marks of their rank. The Duke of Norfolk as Earl Marshal places saltirewise, behind his shield two truncheons, tipped above with the arms of England and below with his own arms. The Lord Justice-general of Scotland in like manner places two swords saltirewise behind his shield.

The full achievement of the sovereign of the United Kingdom of Great Britain and Ireland is shown in fig. XII. Its full blazon is: Quarterly,



Fig. XII.-Royal Arms of the United Kingdom.

first and fourth gules, three lions passant gardant in pale, or, for England; second, or, a lion rampant within a double tressure flory-counterflory gules, for Scotland; third, azure, a harp or, stringed argent, for Ireland; all surrounded by the Garter. Crest.— Upon the royal helmet, the imperial crown proper, thereon a lion statunt gardant or, imperially crowned proper. Supporters.—Dexter, a lion ranpant gardant or, crowned as the crest. Sinister, a unicorn argent, armed, crined, and unguled proper, gorged with a coronet composed of crosses patce and flenrs-de-lis, a chain affixed thereto passing between the fore-legs, and reflexed over the back, also or. Motto.—'Dien et mon Droit,' in the compartment below the shield, with the Union rose, shannack, and this the eigenfred on the same stem.

This article may appropriately conclude with a short account of the various ways in which the royal arms of England, Great Britain, and the United Kingdom have been horne. The Great Seal of Richard Cour-de-Lion, made after his return from the third crusade, had the three lions passant gardant (or leopards) in pale, as they have ever since been depicted. In 1340 Edward III., in virtue of the supposed right of his mather, assumed the title of king of France, and quartered the arms of France (azure, semé of fleurs-de-lis or) with those of England, giving the precedence to the former. Richard II. sometimes bore the reputed arms of Edward the Confessor (azure, a cross flory between five martlets or) impaled with his quartered coat, giving the former the precedence. In conformity with the practice in France, the flems-de-lis were in the later part of the reign of Henry IV. reduced to three in number. No further change took place in the royal esentcheon until the time of James I., except that Mary, on her second Great Seal, made after her marriage with Philip II., impaled the arms of Spain and England.

change took place in the royal esentence in thit the time of James I., except that Mary, on her second Great Seal, made after her marriage with Philip II., impuled the arms of Spain and England.

James VI. of Scotland, on succeeding to the throne of England as James I., quartered the arms borne by preceding sovereigns with those of Scotland and Ireland, the first and fourth quarters being counterquartered France and England, the second quarter being the lion rampant of Scatland; the third, the hap of Ireland. The royal arms were borne similarly by all the sovereigns of the House of Staart until the reign of Anne, except that William III. here en surtent the coat of Nassan: azure, semé of billets, a lion rampant or. In the reign of Anne the legislative union with Scotland brought about a further change; England impaled with Scotland was placed in the first and fourth quartor, France in the second, and Ireland in the third. The accession of George I. displaced England and Scotland from the fourth quarter, to make way for the arms of Hanover (see ante—Quartering). In 1801 George III, laid aside the titular assumption of king of France, and abandoued the French fleurs-de-lis. The arms of England were now made to occupy the lirst and fourth quarter, Scotland the second, and Ireland the third, while the arms of Hanover were placed an surtout. These last were finally abandoued on the severance of Hanover at the accession of Queen Victoria, when the royal esentcheon assumed its present arrangement.

The lion passant (or statant) gardant as the crest of England first appears on the Great Seal of Edward III. The supporters borne in former times by the kings of England varied much, particularly during the early period when these appendages of the shield were invested with more of a decorative than an armorial character, and perhaps often left to the fancy of the engraver. When the arms of any of the English sovereigns from Richard II, to Edward IV, are represented with supporters, the animals chosen are almost indifferently lions, antelopes, or white harts, and occasionally their place is supplied by angels. Edward IV's shield is sometimes supported on one side by a black bull,

and that of Richard III, in one instance by white boars. During the reigns of Henry VII., Henry VIII., Edward VI., Mary, and Elizabeth, the hou, red dragon, and greyhound were the animals most in vogue; the herald or engraver generally choosing as it suited him two out of the three. James I. for the first time clearly defined the royal supporters, adopting the lion of England and unicorn of Scotland as they have ever since been borne.

At the union of 1603 a different mode of marshalling from what has been described was allowed in Scotland, the arms of that kingdom occupying the first and fourth quarter, and England being relegated to the second. The Act of I nion of 1707 contains no provision for the continuance of a special mode of marshalling for Scotland; but the reversed the places of England and Scotland, giving precedence to the latter. The royal arms, as borne in Scotland, are also in use to be encircled with the collar of the Thistle outside the Garter. The Scottish erest takes the place of the English, and the unicorn supporter takes precedence of the lion, the former being crowned and gorged with an antique erown.

The full blazon of the old royal arms of Scotland is as follows: Or, a lion rampant gules, armed and langued azure, within a double tressure florycounterflory of fleurs de-lis of the second. porters. -Two unicorns argent, imperially crowned, porters.—I we uniforms argent, imperianty crowned, armed, erined, and nuguled or, gorged with open crowns, with chains affixed thereto, and reflexed over the back, of the last. Crest.—Upon the imperial crown proper, a lion sejant affrontée gales, crowned or, holding in the dexter paw a sword, and in the sinister a sceptre, both proper. Mottoes.—'Nemo me impune lacessit,' and, over the erest, 'In Defence.'

'In Defence.

'In Defenee.'

Among standard works on heraldry are Guillin's Display of Heraldry (editions of 1610 and 1724); Edmonson's Complete Body of Heraldry (1780); Sir George Mackenzie's Science of Heraldry treated as part of the Ciril Law and Law of Nations (1680); Nisbet's System of Heraldry (1722-43; reprinted 1810); De la Colombière's Science Héroique (1609); varions French treatises of Ménestrier (1671-80); Spener's Opus Heraldicum (1690); and the Nürnberger Wappenbuch. Among modern treatises: Planché's Pursuirant of Arms; Montagu's Heraldry; Butel's Heraldry, Historical and Practical (1864); Seton's Law and Practice of Heraldry in Scotland (1863); Burke's General Armory; Bonton's Traité de Blazon (1863); and Rielstan's Armorial Général (Gouda, 1884). For full bibliography of French works on Heraldry, see L'Art Héraldique, hy H. Gourdon de Genonillac (Paris, 1889).

Heralds' College. See Herald.

Heralds' College. See HERALD.

Herat', capital of the most westerly of the three divisions of Afghanistan, stands on the Hari-Rad, at the height of 2500 feet above the sea, in 34° 50' N. lat., 62° 30° E. long.; distance from Kabul, 390 miles west. Situated near the boundaries at once of Afghanistan, Persia, and the Transeaspian district of Russian Turkestan, Herat is one of the principal marts of Central Asia, carrying on at the same time extensive manufactures of its own in wool and leather. The vicinity, naturally fertile, has been artificially rendered much more so by means of irrigation, drawn from the Hari-Rud and its tributaries. Owing to this abundance in water, Herat and its district has been at all times famous for its rich crops and excellent fruits, in fact it has heen the granary of the north-western portion of Afghanistan and of the adjoining Turkoman country. But the city claims notice mainly on political and military grounds. Long the royal seat of the descendants of Timur, and often a bone of continuous control of the descendants tention between the warlike tribes all round, it is fortified by a ditch and wall, and is commanded on its north side by a strong citadel built under the

direction of British officers, amongst whom the late Sir Eldred Pottinger occupied a pre-eminent In 1885-86 the fortifications of Herat were examined and armed by the military members of the Afghan Boundary Commission. In modern times the place has acquired a kind of European importance, being, towards Persia and Russia, the key of Afghanistan, which country in turn affords the only approach by land to western ludia. In this convention Heart has been several India. In this connection Heart has been viewed as an outpost of England's eastern empire against Russian intrigue and encroachment. Hence it has been alike the subject of treaties and the occasion of wars between Great Britain, as the mistress of India, and Persia, as virtually a vassal of Russia. This feature of the history of the city was more specially developed in connection with the last conflict between Persia and England. In November 1856 the Shah, regarded by the British government as a vassal and agent of the Czar, captured Herat, while actually conducting negotiations for an amicable adjustment at Constantinople; but he was within a few months constrained to out he was within a few months constrained to relinquish his prey and renonnee his claims by a British expedition directed against the opposite extremity of his empire. Since Russia, after subdning the Tekke Turkomans and after having annexed the oasis of Mery (1884), pushed her frontiers as far as Chihl Dukhteran and Kosh Assiah, which is from 30 to 40 miles distant from the casts of Heart the subtingli invertors of Heart that subtingli invertors of the above gates of Herat, the political importance of the place has grown inthensely, and Herat is actually the pivot of the whole Central Asian question. From a commercial point of view Herat has been at all times an emporium for the trade between Central Asia, Persia, and India, as the caravan roads leading from the Oxus and from the Indus towards Persia and Western Asia had found here their point of rice, wool, carpets, raw hides, silk, and leather wares are the chief items of export, whilst chintzes, cloth, sugar, ironwares, and European arms are imported from the West, and quite resolutions of the leather than the leathe cently to a large extent from Russia. In 1890 it was in contemplation to bring Herat into railway connection either through a branch-line coming from the Trauscaspian railway from Dushak via Sarakhs in the north, or via Kandahar from the south, in which case Herat will again acquire its ancient importance from a commercial point of view. The town, famous in the time of Sultan Husein Baikara for its splendid buildings, is to-day a heap of main contact which the second the light of ruins, out of which the citadel, the Charsu, the Tuna Musjid, and parts of the Musallah are prominent as remnants of a bygone glory. The population, consisting chiefly of Persians, Tajiks, and Chihar Aimaks—Afghans constitute only the garrison—has fluctuated within the century from 100,000 to 10,000; the average pop. now being about 30,000. See Malleson's Herat (1880); Yate's Northern of Chamberton (1888) Northern Afghanistan (1888).

Hérault, a maritime department in the south of France, bounded on the south east by the Gulf of Lyons, is oval in form, 84 miles in greatest length from east to west, and has an area of 2393 sq. nr. Pop. (1872) 429,878; (1886) 439,044. It is occupied in the north and north-west by s occupied in the north and north-west by chains of the Cevennes; but the mountainous tracts give place to low plains as the coast is approached, and these in turn to salt-maishes and lagoons next the sea. The largest of the lagoons (*étangs*), Than, covers nearly 20,000 acres. The principal rivers are the Hérault, the Orb, and the Lez, which rise in the Covennes and pursue a generally southward course to the Mediterranean. In the neighbourhood of the *étangs* the climate is unhealthy, especially in summer, when agues and fevers prevail; but elsewhere throughout the

department it is unusually fine, though in summer very hot and dry. About a fourth of the entire area consists of arable land. Previous to the devastating attacks of the phylloxera, this department was counted amought the most important of the wine-growing districts of France. The acreage planted with vines has in ten years decreased from 480,000 to 154,000 acres, and the yield of wine from 390 to about 125 million gallons. The cultivation of olives and the breeding of silkworms and sheep are important industries, as are also the preparation of brandy and liquents, the manufacthre of cloth, glass, soap, and candles, and tanning. Coal is the chief mineral mined. Large quantities of salt are prepared from the saline marshes; and from the shore-lakes and the sea immense quantities of fish are obtained. This department is divided into the four arrondissements of Beziers, Lodève, Montpellier, and Saint-Pons. pellier is the capital.

Herbal, originally a book containing an account of all known plants with their medicinal properties, is now a book containing descriptions only of those plants which possess medicinal properties.

Herbarium, or Horrus Siccus ('dry garden'), a collection of specimens of dried plants, intended for the future study and examination of hotanists. Specimens intended for the herbarium should be as perfect in all their parts as possible. They are laid between layers of blotting or botanical paper, and subjected to pressure to dry them. The pressure should be light at first, but increased as the process of drying goes on. The paper requires to be changed frequently—daily in the case of succedult specimens. Special methods have to be adopted in the case of very succedent specimens, such as orchids, &c.: only very slight pressure must be given; and subjecting them to constant uniform heat, as in hot sand, placing them in an oven, or suspending and turning them before the fire, enveloping them first of course in paper, indicate some of the modes of proceeding with such-like specimens. When dried they are mounted on paper, and, if they are to be of any scientific value, the generic and specific names of each should be attached, along with all other data bearing on its identity, such as habitat, &c. Cure must be taken to preserve specimens from the ravages of moths and beetles by frequent inspec-tion, by the aid of camphor, and by the occasional application of a little corrosive sublimate.

Herbart, Johann Friedrich, a German philosopher, was born at Oldenburg, May 4, 1776. At a very early age ho was familiar with religious and metaphysical doctrines and discussions, and in his eighteenth year he became the pupil of Fichte at Jenz. In 1805 he was appointed extra-ordinary professor of Philosophy at Göttingen; in 1809 he went to Königsberg as Kant's successor; but in 1833 returned to Göttingen, where he remained till his death, August 14, 1841. His collected works were published by his scholar Hartenstein (12 vols. 1850–52; new ed. 1883 et seq.).

Herbart starts from the Kantian position by analysing experience. In his system logic, metaphysics, and restlicties rank as co-ordinate elements. Logic deals with the formal elements of thought, metaphysics and esthetics with its content. Of these two the former investigates those of our empirical conceptions which are given as in experience, and which cannot be alienated from our thought, whilst the latter deals with those condisapproval. The most characteristic features of his thinking are, however, these. He posits a multiplicity of 'reals,' or things which possess in

themselves absolute existence apart from apperception by the mind of man. He rejects the notion of separate mental faculties, substituting in their place the conception of primordial presentations or forces, from whose action and interaction all psychical phenomena result. From the conditions which determine the equilibrium and movement of these presentations he deduces a statics and a dynamics of mind, both amenable to mathematical manipulation, and thus introduces psychology to a place among the exact sciences. This in the eyes of many constitutes Herbart's chief merit as a philosopher. Ethics he ranks as a branch of asthetics; its province is to investigate the agreement or disagreement which obtains between the relations of relition and certain fundamental moral ideals, as personal freedom, perfection, benevolence, justice, and equity.

Herb Christopher. See BANEBERRY.

Herbelot, BARTHELEMY D', a French orientalist, was born in Paris, December 4, 1625. He devoted himself to the study of oriental languages, and finally became (1692) professor of Syriac in the Collège de France. He died at Paris, December 8, Office de France. Its drei a France o, 1695. His celebrated work, La Bibliothèque Orientale, was published after bis death by Galland (1697; 3d ed. 4 vols. 1777-83). It is a universal dictionary of all knowledge known to the Orient, and is principally based upon the Arabic work of Hajji Khalfa; although lacking in critical accuracy, it is full of important information for those who do not read Arabic and other oriental tongues.

Herbert. Herbert Fitz-Herbert was chamberlain and treasurer to King Henry I. Seven or eight generations later, we find the Herberts diverging into several distinct branches, including the lines of the Earls of Powis (now extinct in the male line), of the Lords Herbert of Cherbury (also several untitled branches which have flourished upon their ancestral lands in England, Wales, and Ireland. In the reign of Henry V. Sir William Herbert of Raglan Castle, County Monnouth, received the honour of knighthood in reward of his release, in the Erench ways. valour in the French wars. His eldest son, a stanuch adherent of the House of York, was created Earl of Pembroke by Edward IV, in 1469, but fell into the hands of the Lancastrians after the battle of Danesmoor, and was beheaded the following day. His son became Earl of Huntingdon.

The title of Earl of Pembroke was restored to the

Herberts in 1551 in the person of the sou of an ille-gitimate son of the first earl. The new earl was one of the most influential noblemen of his age, and one who took an active part in public affairs, both as a statesman and a soldier. By his wife, who was a sister of Catharine Parr (the last queen of Henry vIII.), he had a son Henry, second earl, to whose counters, Mary ('Sidney's sister, Pembroke's mother'), Sir Philip Sidney dedicated his Arcadia. It has been attempted to identify Shakespeare's 'W. H.,' the 'only begetter' of the Somets, with the third earl, who succeeded in 1621. The fourth earl, some time Lord Chamberlain to Charles I., and Chancellor of the university of Oxford, was also Earl of Montgomery. The eighth earl held several high oflices under Queen Anne, including that of Lord High Admiral. Lord Herbert (q.v.) of Lea was a younger son of the cleventh earl; and his son became (1862) thirteenth Earl of Pembroke, and tenth Earl of Montgomery. The Earls of Carnaryon, more than one of whom have gained celebrity in the field of literature, descend from the eighth Earl of Pembroke montioned above. The recent Earls of Powis are descended from the same stock maternally, the only child and heiress of the last Earl of Powis of the Herbert

stock having married the eldest son of the illustrious Lord Clive, in whose favour that title was renewed in 1804

Merbert, Edward, Lord Herbert of Cherbury, soldier, statesman, poet, and philosopher, was born of the ancient and noble House of Herbert, apparently on the 3d March 1583, at Eyton in Shropshire. He was sent to Oxford in his twelfth year, and before he had quite quitted his studies he married an heires considerably older than himself. On the occasion of the corotation of James I, he was made a knight, and invested with various offices. He left home, accordingly, for France in 1608, and in Parislived in terms of intimacy with the Constable Montmorency, Isaac Casanbon, and other distinguished men. After a brief return to his native country, he set out again in 1610 for the Low Countries, where he joined the arms of Manrice of Orange; and he again offered him his services in 1614. After a campaign, he travelled through Germany and Italy on horselack, and went as far as Venice, Florence, and Rome. On his way back he got into trouble through an attempt which he made to raise a troop of Protestant soldiers in Langueloc for the Duke of Savoy. Shortly after, he returned to England, and was made a member of the Privy-conneil; then sent to France, first as extraordinary ambassador, and then as ordinary ambassador. He tried, but without much success, the difficult task of negotiation between Louis XIII. and his Protestant subjects, was ultimately dismissed, and in spite of eager solicitation never received any further appointment. He was elevated first to be a peer of Ireland, and then in 1630 to he a peer of England, with the title of Baron Herbert of Cherbury. When the Civil War hooke ont he at first sided with the royalists, but ultimately surrendered his castle to the parliamentarians, with whom he afterwards lived on easy terms. He was commonly regarded as having saved his possessions at the expense of his honour. He died in London, 20th Angust 1648.

Selden, Ben Jonson, Grotius, and Gassendi, was best known to his contemporaries is his De Veritate —an anti-empirical theory of knowledge, which in many respects anticipates the common-sense philosophy of the Scottish school, and is at times even Kantian. His De Religione Gentilium (1645) is a 'natural history of religion,' by means of which Herbert finds that all religious, annust their extravagances or follies, recognise what were for him the five main articles of religion—that there is a supreme God, that he ought to be worshipped, that virtue and purity are the main part of that worship, that sins should be repented of, and that there are rewards and punishments in a future state. In virtue of this 'charter of the deists,' Herbert is not unjustly reckoned the first of the deistical writers. The Expeditio Buckinghami Ducis (1656) is a vindication of his patron's ill-fated expedition. The ill-proportioned Life and Raigne of King Henry VIII. (1649) glorifles Henry overmuch, and is by no means accurate. His best-known work, the Autobiography, a brilliant picture of the man and of contemporary manners, may fairly be regarded as a masterpiece in its kind; but it is disfigured by overweening conceit and self-glory in his own personal beauty, noble blood, valour in quixotic duels, favours from famous ladies, and generosity, and is not to be regarded as veracious. It comes down only to 1624. The *Poems*, Latin and English, which may be divided into somets, elegies, epitaphs, satires, miscellaneous lyrics, and occasional pieces, reveal in their author a representative of Donne's, or the 'metaphysical,' school;

many, in the jndgment of a recent editor, are of real and true poetry, in some respects resembling Browning, in some anticipating Tennyson. See Rémusat's monograph on Herbert (Paris, 1874); (Inurton Collins's edition of the Poems (1881); and Sidney L. Lee's edition of the Antobiography, with introduction and continuation (1886).

Herbert, George, an English poet, was born in Montgomery Castle, in Wales, on the 3d April 1593. His family was a younger branch of that of the Earls of Pembroke. His eldest brother was Lord Herbert (q.v.) of Cherbury, who says of him: 'My brother George was so excellent a scholar that he was made the public orator of the university of Cambridge, some of whose English works are extant, which, though they be care in their kind, yet are far short of expressing those perfections he had in the Greek and Latin tongue, and all divine and human literature. His life was most holy and exemplary, in so much that about Salisbury, where he lived beneficed for many (?) years, he was little less than sainted. He was not exempt from passion and choler, being infirmities to which our face is subject; but, that excepted, without reproach in his actions.' George Herbert's mother was a Newport, of the old Shropshire family of the Newports of High Ercall. She was left a widow, and devoted herself to the education and training of her seven sons, in which effort she was singularly successful. Her memory has come down to us as one of those many mothers of the English race to whom it owes so much. Under her influence and that of Dr Neville, Dean of Canterbmy and Master of Trinity College, Cambridge, the foundations were laid of a character of almost perfect beauty. In 1615 George Herbert was elected Fellow of his college, and in 1619 promoted to the office of Public Orator, in which place he continued eight years, and, as Izaak Walton says, 'managed it with as becoming a grace and gaicty as any had ever before or since his time.' 'If during this time, he continues, he expressed any error, it was that he kept himself too much retired, and at too great a distance from all his inferiors, and his clothes seemed to prove that he put too great a value on his parts and parentage. The antecedents of his family, indeed, and his position at the university, naturally led him to expect advancement at court; but on the death of King James his thoughts became more decidedly drawn towards a distinctly religious life—a life which his mother had always wished him to follow. After a period of seclusion in the country, he finally decided to relinquish all expectation of court favours, and to devote himself entirely to the religions life. In 1626 he was made prebend of Layton Ecclesia in the diocese of Lincoln, and in 1630, the year of his marriage to a kinswoman of the Earl of Danby and daughter of Mr Charles Danvers of Bainton, in the county of Wilts, he was presented, by the favour of his kinsman the Earl of Pembroke, to the vicarage of Bemerton, near Salisbury; King Charles I. saying, when the earl solicited the presentation which had lapsed to the crown, inost willingly to Mr Herbert, if it be worth his accentance. He only an invest this vice sure for the contraction. He only enjoyed this vicarage for two acceptance.' years, dying in 1632; yet in that short time he left a memory which still survives. No one who reads his Country Parson, a description of an ideal parson's life, which is doubtless to a considerable extent a picture of his own life and conduct, will be surprised at this fact. Walton says of him, 'his aspect was cheerful, and his speech and motion did both declare him a gentleman; for they were all so meek and obliging that they purchased love and respect from all that knew him. He was naturally the intimate of the most cultured natures of his day, but the reality of religious life led him, as it

has done others, to a perfect sympathy with the uncultured and the ignorant. He was an accomplished musician, who recognised in music not a science only, but a divine voice; and his poetry is the natural result of his training and of his life. It exhibits a singular combination of the attributes of a courtier, a gentleman, and a saint. It manifests a knowledge of life, and of the world, and a certain strength and force of thought and of expression which has made his verses the favourite reading of men who are not generally attracted to sacred and devotional poetry; and this quality will probably ensure for his poems a lasting, though perhaps limited, number of students and admirers.

See lus Works in Prose and Verse, with Life by Walton, and notes by S. T. Coloridge (1846); also editions by Professor Nichol (1863) and Grosart (1876); and J. H. Shorthouse's preface to The Temple (1882).

Herbert, Sydney, Lond Herbert of Lea, minister and statesman, was the son of the eleventh Earl of Pembroke by his second wife, the daughter of Count Woronzow, and was born at Richmond, 16th September 1810. Educated at Harrow and at Oriel College, Oxford, he devoted himself to public life, and cutered the House of Cammous in 1832 as member for South Wilts, which he represented until his elevation to the peerage in 1861. He began his political career as a Conservative, and was Secretary to the Admiralty in Sir R, Peel's administration from 1841 to 1845, when he became Secretary-at-war. It fell to him to tary-at-war. It fell to him to appose Mr Cobden's motion for a select committee to inquire into the effect of the corn laws. He went out of office with his party in 1846. In 1852 ho was again Secretary-at-war, under the Aherdeen ministry, and, in consequence, the 'horrible and heart-rending sufferings' of the army before Sebastopol were laid in a great degree at his door. He was for a few weeks Colonial Secretary in the

first administration of Lord Palmerston in 1855, and Secretary-at-war in his second administration in 1859. Great improvements in the sanitary condition and education of the army, the unadenma-tion of the Indian with the rayal army, and the organisation of the volunteer force signilised his army administration. He largely reformed the War Ollice, and was devoting himself with equal zeal and intelligence to his ministerial duties when, owing to failing health, he resigned his sent in the House of Commons, and in 1861 was called to the Upper House, under the title of Baron Herbert of Lea. But release from labour came too late, for he died Angust 2, 1861. He was heir-prosumptive to the twelfth Earl of Pombroke, and his son became thirteenth earl,

Herb Gerard. See BISHOPWEED.

Herbiv'ora ('plant-eaters'), in some of the elassifications of the Manmalia, has been regarded as an order (co-ordinate with Carnivora), and by some been divided into Artiodactyla and Perissodactyla. See Mammalia, Ungulata.

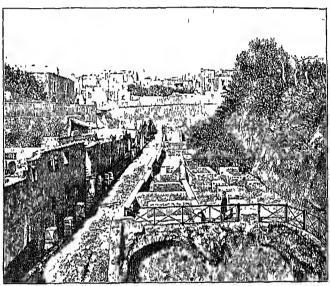
Herb Paris. See Paris.

Herb Robert. See GERANIUM.

Herbs, or Herbaceous Plants, are those which do not form a persistent woody stem above ground. They are annual, biennial, or porcurial. An annual springs from seed, blossoms and dies in one season.

A biennial vegetates only during the first growing season, and stores up nourishment in its root stock which persists through the winter; during the second growing season the root-stock sends up flowering shoots, and after fructification the whole plant dies. When the 100t-stock perennates, and only the acrial shoots die at the end of each grow ing season, the plant is perennial. See Pot-Herrs

Herculancum, an ancient city of Italy, so called from the local worship of Hercules, was situated at the north-western base of Monnt Vesuvins, about 5 miles E. of Naples. Consider. able obscurity envelops its early history; it is supposed, however, to have been of Phanician origin, and to have been occupied afterwards by Pelasgians and Oscans. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later it fell into the hands of the Romans. In 63 A.D. the city was seriously injured by a violent



General view of the Excavations at Herculancum.

carthquake; and in 79 it was buried, along with Pompeii and Stabiae, by the memorable cruption of Vesnvins (q.v.) which took place in that year. It now lies at a depth of from 40 to 100 feet below the surface, and is lilled up and covered with volume to the surface of the surfac canie tufa, composed of sand and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic emptions. Above it, on the modern surface, are Portici and Resina, two villages now absorbed in the suburbs of Naples. In 1706, on the occasion of deepening a well, fragments of mosaics were first brought up; but little was done for systematic excavation till 1738, when explorations were commenced under royal anthority. It was then discovered that the building near the bottom of the well, from which the first relies were obtained, was the theatre. This building was forthwith explored and cleared, and several statues, both in bronze and murble, were extracted from it. Excavations were earried on but to a limited extent, not only in consequence of the hardness of the tufa, but from the fear of undermining the dwellings on the surface. Hence but a portion of this entombed city is yet visible, the chief edilice shown being still the theatre, which had been built a short time before the fatal eruption. It has eighteen rows of stone seats, and could accommodate 8000 persons. Part of the Forum with its colonnades, a colonnade

(mistaken at first for a basilica), two small temples, and a villa have also been discovered; and from these buildings many beautiful statues and remarkable paintings have been obtained. Of late years excavations have been icsumed under government, with important results, particularly as to the plan of Herculaneum, and in 1880 mins of extenplan of Herentamenin, and in 1880 rmins of extensive baths and of the accessory buildings were brought to light. A general view of the exposed city (1889) is given from a photograph. Among the art-relics of Herentamenin, which far exceed in value and interest those found at Pompeii, are the statues of Eschines, Agrippina, the Sleeping Fann, the Six Actiesses, Mercury, the group of the Satyr and the Goat, the limits of Plato, Scipio Africanus, Augustins, Seneca, Demosthenes, Sci. These treasures, textures the with such years and &c. These treasmes, together with such vases and domestic implements as have been found, are on view in the National Museum at Naples. For the classical student La Villa Ercolancse dei Pisoni, by Comparetti and De Petra (Turin, 1883), is recommended. See PAPYRI.

Hercules (Gr. Hīracles), the beloved son of Zeus by Alemene (of Thebes), was intended by his father to be king of the Argives; but Hera, the jeulous spouse of Zeus, by a trick caused Eurystheus to become king of Argos. Nor was her wrath satisfied with this; she made Herenles serve Eurystheus, by far the infetior man. And he enjoined hard adventures on Hercules, even sending him to Hades to fetch up the dog Cerberns. Thus Hencules was downed to a life of trouble, and became the type amongst the Greeks not only of manly strength, but of manly endurance. Desides the labours imposed on him by Emystheus, Hercules undertook adventures on his own account, killing a sea-monster that lavaged Troy, and destroying Troy when the mares promised him as reward for killing the monster were denied him. His love of horses also led him to kill Iphitus, though his guest. Finally, after death, he himself joined the banquet of the deathless gods, with Hebe as his wife; but his phantom, armed with how and arrow and gold baldrie, with wild boars and lions wrought upon it, terrified the dead in Hades. Thus far

according to Homer.

Hesiod adds four more labours, imposed by Eurysthens—the destruction of the Nemean lion, of the Lernean hydra, fetching the over of the triple-bodied Geryones, and the golden apples of the Hesperides; and Hesiod includes amongst the parerga, or voluntary exploits, freeing Promethens from the eagle which tortued him. From later authors we hear of yet more labours, the number of which was first fixed at twelve by Pisander (who lived about 650 B.C., and wrote an epic poem on the adventues of Herenles), though this number was not regarded as a canon either of poetry or art. They are the destruction of the Erymanthian hoar, and of the Stymphlalian birds; the capture of the Cretan bull, of the stag of Ceryncia, and of the horses of Diomedes; the cleansing of the stables of Angeas; and obtaining the girdle of the queen of the Amazons. Many voluntary exploits are added by later writers to the parerga mentioned by Homer and Hesiod, and are as a rule brought into connection with the Homeric story of Hercules, the outlines of which they fill up. Thus, Homer mentions Megara as the wife of Hercules; later writers recount that she was the daughter of the king of Thebes, and that her hand was hestowed on the hero in reward for having freed the Thebans from their tribute to the Minyæ. The story of Herenles' service as a slave to the Lydian Omphale is connected with the Homeric story as being the atonement for the murder of Inhitus. When all atonement for the murder of Iphitus. When all other resources fail, topography is made to afford the connection. Thus, the fight with the Centaurs

is connected with the labour of destroying the Erymanthian boar, because the scene of the one adventure is in the neighbourhood of the other. It is on his way to Thrace in quest of the horses of Diomedes that Hercules rescues Alcestis, who had given her life for that of her linsband Admetus, the gnest-friend of Hercules. It is on his way back from the west, when he is returning with the cattle of Geryones by way of Italy to Greece, that he destroys the mouster Cache, who stole his oxen. It is on his way to Gadira in search of Geryones oxen that he travels in the mystic beaker given to him by the sun-god. And finally, it is on passant that he founds the Olympian games also. But in all cases we find that Herenles has become the national hero of the Greeks, and that he is regarded not only as the type of manly endmance, but also as the self-sacrificing hero who succous the oppressed and rids earth of its monsters. As to the manner of his death nothing is said by Homer, but in later times the story was, that, in the agonies caused by the property of the story was that the story was the same of New years to be his in all lines. poisoned robe of Nessus sent to him in all innocence as a love-charm by his wife, Deianira, he threw himself on to a finicial pyre on Mount Œta, and was thence carried up to beaven.

It is maintained by some scholars that the origin

of Hercules as a mythical figure is not Greek, not even Indo-Emopean, but oriental. And in support of this view there are traits to be found both in literature and art which are undoubtedly oriental. Iterature and art which are undoubtedly oriental. Thus in literature the mystic beaker in which Hercules travels to Galira is undoubtedly the symbol of the oriental sungod. The number (twelve) of Hercules' labours is that of the signs of the zodiac. In art the lion-skin which is the characteristic garb of Hercules is undoubtedly a loan from the East; and the resemblances between ancient types of Hercules and the idols of the Phænician god Besa are undeniable. And even the Greeks themselves identified Hercules with Mel. Greeks themselves identified Herenles with Mel-cath of Tyre. In his physical strength Hercules brings to mind Samson, and Samson, on the other hand, has been explained by a venturesome mythologist (Goldziber) as being, like Hercules, a solar bero. But on examination the hypothesis of the oriental origin of the figure of Hercules breaks down. It is quite true that there are amongst the many and diverse elements in the myth of Herenles some of undonbtedly oriental origin; but name of these can be traced back further than the time of Pisander. The story of Herenles as told in Homer is purely Greek. Thus the number (twelve) of Herenles' labours, which forms such an admirable basis for the theory that Herenles is a solar hero and of oriental origin, cannot be traced back fur-ther than the time of Pisander, by whom it may well have been horrowed from some castern story, for he lived in Rhodes, which was exposed to

time when Phænieian art was already under the influence of Greek. That the Greeks themselves identified Hereules with some strange god, whether of Egypt or of

in part due to the fact that the latter date from the

oriental influences. The beaker of the sun-god, again, is borrowed from the East, but is no part of

the equipment of the original Homeric Hercules. The lion-skin, which subsequently became the characteristic garb of Herenles, was imported from the Orient. This is indicated by the fact that Pisander

first introduced it into literature, and is confirmed

by the circumstance that it appears in art for the first time in images from Cyprus, which were plainly produced (as might be expected in Cyprus) under oriental influences. But the lion-skin is not

found in literature older than Pisander, and it is the resemblances between the ancient types of Hereules and the idols of the Phonician Besa are

They, Tyre, is natural enough, but proves nothing. like the Romans, were ever on the alert to identify the gods they knew of old with the new deities of foreign nations. Indeed, it is in this tendency that we have to look for the explanation of the growth of the story of Horenles. It is because the Greeks recognised, or thought they recognised, their national hero in the oriental sun-god, that traits and stories belonging to the latter became attached to the former. In this way the hero of the Lydian story was identified with Herenles, and the story of his service to Omphale transferred to Hercules. On the same principle we may probably detach the Italian story of the mouster Caens as an accretion. The Italians recognised in Herenles their own native Genius Jovis, of whom the Caens-story was originally told. Not only was the story absorbed into the Herenles-cycle of myths, but Herenles eclipsed the Genins Jovis in Italy itself. It has, indeed, been supposed that the story of Hercules was known to the Greeo-Italians, the common ancestors of Greeks and Italians; but, apart from the doubt which now attaches to the very existence of Graco-Italians, the Latin name Hercules is undoubtedly (like that which it stands for) borrowed from the Greek. Hercules, as a matter of phil-

from the Greek. Herenies, as a matter of philology, is a loan-word from the Greek Heracles.

Not only, however, is it possible to strip the original Homeric story of Italian and oriental accretions; it is also possible to trace its growth within the limits of Hellas itself. For as the Greeks identified their national hero with foreign deities and heroes, so Hercules came to be the national Greek hero, because the various Greek states identified him with various local heroes. Thus the Ætolian myth of Dejanira and the role of Nossus came to be attached in the time after Homer to Hercules. And even in the Hercules of Hamer and Hesiod we can detect at least two local heroes. The son of Alemene of Theles was proliably not originally the same here as the Hercules whose exploits in destroying the Lermonn hydra, Nemean lion, and the Erymanthian boar are localised in the Poloponucse. And this view is confirmed by the fact that, whereas the Pelaponnesian hero is named Heracles, the Theban hera was known as Alegens ('the strong man'), or Alcides ('son of strength'), and compilers of myths had to allego that the change of name from Alcides, the less known name, to Herenles, the better known, was ordained by the Dolphian oracle.



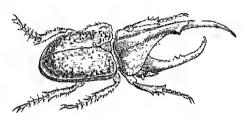
Farnese Hercules.

Further back than this it seems impossible to trace Hercules. There is no reason to imagine that Hercules was known to the Indo-Europeans before their dispersion; and even if some of his adventures (c.g. the oldest labourthat of fetching up Cerberns from the nether world) are really solar in character, we need not close our oyes to tho fact that the strong man is a natural subject for myths.

In art, Herenles is represented as the type of manly strength, with muscular limbs, enrly with hair, and somewhat small head; a club and lion's skin are often added. The most notin the baths of Caracalla in 1599, and now in the museum at Naples. It is the work of the Athenian Glycon, but probably a copy of a work by Lysippus.

Hercules, Pillars of, the name given by the ancients to two rocks flanking the entrance to the Mediterranean at the Strait of Gibraltar. According to one version of the legend, they had once been united, but Hercules tore them asunder to admit the ocean into the Mediterranean; another version represents him as causing them to unite temporarily in order to form a bridge. They seem to have been first visited by the Phenicians about 1100 B.C. Calpe, one of them, is now identified with Gibraltar, and Abyla, the other, with Centa.

Herenles Beetle (Dynastes herenles), a gigantic lamellicorn beetle from tropical America, sometimes 6 inches in length. The male bears on the thorax an enormous horn, which is met by a shorter upturned horn from the head, the whole resembling a pair of large but somewhat unequal pincers, of which the body of the insect is the



Hercules Beetle (Dynastes hercules).

handle. The female is without horns, and decidedly smaller. Another species, D. titigus, about 2 inches in length, occurs in the United States. The genus Megasoma is nearly allied to Dynastes. See also COLIATH BEETLE.

Hercules' Club is the trivial name of a West Indian tree (Xanthoxylum clava-Herculis), for a kind of gourd, and for a species of Aralia.

Hereynian Forest (Lat. Hereynia silva), the general designation of the entire wooded monutain-ranges of middle Germany, from the Rhine to the Carpathian Mountains. Different ancient writers apply the name sometimes to one of the constituent ranges, sometimes to another. Modern geographers, and more particularly geologists, apply the term Hereymian system to all the moun-These have for the most part a north-west to south-east strike, and are all older than the close of the Cretaceous period.

Herder, JOHANN GOTTFRIED, one of the most thoughtful and suggestive of German writers, called by De Quincey the Coloridge of Germany, equally important as a philosopher, a theologian, and a literary critic, was horn at Mohrungen, in and a literary critic, was horn at Mohrungen, in East Prussia, on 25th Angust 1744. He studied at Königsberg, and there became acquainted with Kant and Hamann, the 'Magus of the North.' The latter inspired young Herder with love for the poetry of primitive peoples and the study of the obscure beginnings of civilisation, and for the literature and love of the Orient, especially of the Bible. But perhaps the greatest thing that Hamann did for Herder was to awaken him the intellectual freedom to companying the suite of the suite of the study of the suite of the study of the to intellectual freedom, to emancipate his mind from traditional habits of thinking and stimulate him to prosecute lines of independent search. In 1764 Herder became assistant-teacher in a school, and assistant-pastor in certain churches, in Riga. Being convinced that literature was to be his life's calling, he began to practise it by writable statue is the so-called Farnese Hercules, found | ing Fragmente über die neuere deutsche Literatur

(1766-67), Die kritischen Walder (1769), and minor pieces, in which he maintained that the truest poetry is the poetry of the people, the spontaneous, martificial expression of the characteristic human nature that is in them; and, in the spirit of Winckelmann and Lessing, he took up a brief for the idiosyncratic development of national genins in opposition to the fashionable pseudoclassicism of the day. He was an impressive preacher, the subject of his sermons, as of all his writings, being man qua man in all phases of his essential and complex nature. Leaving Riga in 1769, he spent some mouths in travel. It was during this tour that he made the acquaintance of young Goethe at Strasburg; from Herder the future literary imperator of Germany learned to understand the realities of life. In 1770 Herder accepted the appointment of court-meacher at Backeburg; but six years later he exchanged this uncongenial post for that of first preacher in the town church of Weimar, a position which, partly owing to untoward circumstances, partlyand perhaps principally—to his own innate irrin-bility of temper, proved to be little less uncon-genial, in spite of his intercourse with Guethe and the other literary celebrities then gathered in Weimar. It was there that Herder died on 18th

December 1803. Herder's love for the songs of the people, for human nature unadulterated, for simple truth warm with the blood of life's reality, in preference to classic grace and coldness, and the beautiful but artificial poetry of cultured minds, found expression in an admirable collection of folksongs, Stimmen der Volker in Liedern (1778-79), in his favourite book, Vom Geiste der Hebraischen nn in invarinte book, Fom Geiste der Hebratischen Poesie (1782-83; Eng. trans. by James Maish, 1833), Ueber die Wirkung der Dirhtkunst auf die Sitten der Volker (1778), in a series of oriental mythological tales, in parables and legends, in his version of the Cid (1805), and other works. The principal constructive idea of his thinking was however, when we have the constructive idea of his thinking was, however, what we should now call the sense of the supreme importance of the historical method. The stimulus of this thought is discernible not only in the works quoted above, but in such books as Ucber den Ursprang der Spruche (1772), Die ülteste Urkunde des Menschengeschlechts (1774-76), and especially in his greatest masterpiece, Ideen zur Geschichte der Menscheit (1784-91; Eng. trans. by T. Churchill, 1800), which, like so many of his other books, was left uncompleted. This work is not only the ripest product of his thinking; it is, as it were, the capital of his intellectual kingdom, in which are gathered all the wealth and beauty and power of his mind. Besides its great intrinsie value, the of the supreme importance of the historical method. his mind. Besides its great intrinsic value, the book is remarkable for its anticipations and adunbrations of evolutionary theories. Herder shows that higher and higher types of organisation are observable in all things, stones, plants, and animals, until the culminating type is reached in man; and, as the scale is ascended, a closer and closer resemblance to the culminating type is revealed both in organisation and in the development of powers and instincts. Moreover, the more complex the organisation of a being the greater the extent to which that organisation partakes of the forms existent in the lower grades. But he does not vitalise the scheme of the universe by the conception of genetic development, or the doctrine of organic descent. He does, however, recognise, in a more or less imperfect way, the struggle for existence and adaptation to environment. The end for which all things exist that do exist is, he teaches, man, the crowning work of the universe. But man is not merely the crowning work of the universe; he is also,

by analogy of reasoning from the laws of nature, the first and rudest link in a still higher series of existences, and that which he has in common with them is his pure bunanity, or that inner common wealth of intelligent, sensitive, and spiritual powers which constitute his characteristic nature qua man. Hence the life-business of man is to cultivate these elements of his peculiar lumanity, this process heing the loftiest aim of philosophy as well as the alpha and omega of all religion.

Herder belongs to that rare class of writers who, like Jean Paul and Novalis, like Kierke-gaard, like Wordsworth and Enerson, feel and and interest, each in his several way, the poetry of philosophy and the philosophy of poetry, and recognise the higher synthesis of both with religion. He was a philosopher, not of the school or of the academy, but of life. Yet Herder can scarcely be called a great writer in the purely literary sense; bis writings have too many shortcomings, especially in the way of artistic finish and completeness. Nor is he justly entitled to the bay leaves of the poet, in spite of his *Cid* and his poems. His last years were chiefly occupied, apart from the *Ideen*, with the *Humanitatsbriefe* (1793-97) and an ill-advised

polemic against Kant.

His Sümatliche Werke, 60 volumes in all, were published in 1827-30. The best of the later issues are Suphan's edition of the 'collected works' (32 vols. 1877-87) and his edition (with Redlich) of the 'selected works' (9 vols. 1884 sq.). See Erinacrungen, by Horder's widow, ed. by J. G. Müller (1830); Herder's Lebensbild, by his son Emil (1846-47); and various collections of his Letters. The best Life is Haym's (2 vols. 1880-85); but read also Joret, Herder et la Renaissance Litteraire en Allemagne (1875), and H. Nevinson's Herder and his Times (1884).

Herd Grass. See Bent Grass.

polemic against Kaut,

Heredity, the organic relation between generations—especially between parents and allspring.

Facts.—All offspring produced by sexual repro-

duction, from a niale and a female organism, owe balf of their essential (nuclear) material to each parent. Therefore through successive generations there persists a constancy of likeness or stability of type, as expressed in the familiar saying that 'like begets like.' Besides this general resemblance between offspring and parent, there is frequently a reappearance of minute features, idiosyncrasics, and peculiar traits, yet this is not inconsistent. and peculiar traits; yet this is not inconsistent with the occurrence of variations, which are in part due to the twofold origin of the offspring, and force use to the tworous origin of the offspring, and force us to modify the familiar saying into 'like tends to beget like.' In many cases, moreover, the offspring exhibits not only parental, but grand-parental or ancestral characteristics, which when very pronounced or remote are called 'Atavisus' (q. r.) or 'reversions.' Nor is the inheritance confined to portugal characters for discussed pathylogical. normal characters, for diseased, pathological, or abnormal conditions of parents or grand-parents often reappear in the offspring, though this reappearance is not always due to transmission. Characteristics acquired by the parents, not as outcrops of their innate constitution, but as the results crops of their innate constitution, but as the results of use and disuse, or as dints from the environment, often reappear, though there is lack of evidence that they are transmitted. Finally, throughout successive generations, there is a tendency to sustain the specific average, by the continued approximation of exceptional forms towards the mean of the species.

Denials.—While a few have been so misguided by prejudice as to maintain that there was no transmission at all, and while a few have exaggerated beyond all eredence the undeniable tendency of similar work and surroundings to make offspring like their parents, there is no scepticism of any importance except that which denies the transmission of individually acquired characters. Be it clearly understood that 'natural inheritance' is a certain fact; innate, constitutional, congenital, or germinal qualities, and the results of these in the parents, are certainly transmissible to the offspring; the disputed problem, which awaits experimental evidence, is to what degree, if any, extrinsic, functional, or environmental modifications acquired by the parents can be handed on as a legacy for good or ill to the offspring. That such acquisitions often recur is indubitable, but it is not at present certain that they recur because they have been transmitted. They may of course be the result of the action on the offspring of the same conditions as first evoked them in the parents.

Problems.—In regard to the relation between parents and offspring, there are three great problems to be discussed. What is the peculiarity of the germ-cells which enables them (in most eases after uniting as male and female elements) to develop into organisms essentially like the parents? Granting that the germ-cells are in some respects unique when compared with the ordinary cells of the 'body,' granting that the fertilised egg is in some sense a potential organism, how are we to think of the mechanism of development by which the specific type is reconstructed? Thirdly, what is the probable truth, or present state of opinion, in regard to the transmission of acquired as opposed to constitutional or germinal characters? In addition to these three great problems of individual inheritance, there are minor questions in regard to atavism, reparation of injuries, and the like, detailed practical inquiries as to the inheritance of disease, and, widest of all, those problems of social inheritance which concern the relation between large fraternities of the lumnar species through successive generations.

mirge fractions.

Mystical Theories.—Theories of heredity, like those of many other facts, have been expressed in three sets of terms—theological, metaphysical, and more or less scientific. The ancient hypotheses, that germs were possessed and controlled by spirits, gave place to theories which invoked 'principles of heredity' and 'fornative forces,' and these in turn have been displaced by more concrete conclusions. Of most historical importance are the so-called 'mystical' or 'proformation theories,' according to which the male or female germ contained a miniature model of the future organism, and indeed of succeeding generations as well, while the development was merely a gradual unfolding or literal 'evolution.' We still believe of course that the fertilised egg is a potential organism, and that it has great complexity within its apparent simplicity, but the researches of the founders of embryology were enough to show that no miniature models existed, and that development was anything but the unfolding of a bud. See Emmryology.

Panyenesis.—Many naturalists have attempted to

Pangenesis.—Many naturalists have attempted to explain the uniqueness of the germs or germ cells by regarding them as concentrations of units collected from the various structures of the body. The hypothetical process by which these units are given off from the various organs, travel to the seat of the germs, and are there accumulated to reproduce in the embryo structures like those whence they originated, is tormed pangenesis. At such different epochs as are suggested by the names of Democritus and Hippocrates, Paraceisus and Buffon, pangenetic theories were advanced. The first clear theory, however, was that of Spencer (1864), who suggested the existence of 'physiological units,' derived from and capable of development into cells, and supposed their accumulation in the reproductive elements. But the best-known form of the theory is Darwin's 'provisional hypothesis of pangenesis' (1868), according to which (a) every cell of the body, not

too highly differentiated, throws off characteristic too highly differentiated, throws on characteristic genniules, which (b) multiply by fission, retaining their peculiarities, and (c) become specially concentrated in the reproductive elements, where (d) in development they grow into cells like those from which they were originally given off. Somewhat later (1876) the ingenious Jüger songht to replace Themis's computes by abstractivities specially Darwin's genunules by characteristic 'scent stuffs, which were collected from the body into the reproductive elements; he suggested, in other words, what may be called chemical pangenesis. Meanwhile (1872) (falton had been led by his experiments on the transfusion of blood and by other consider. ations to the conclusion that 'the doctrine of panreaching forward to something better, he still allowed a limited pangenesis to account for those cases which suggest at least that acquired characters are 'faintly heritable.' He admitted that a cell 'may throw off a few germs [i.e. genumles] that find their way into the circulation, and have thereby a chance of occasionally finding their way to the sexual elements, and of becoming naturalised among them. In 1883 Professor W. K. Brooks proposed an important modification of Darwin's theory, especially insisting on the following three points: that it is in numerical and abnormal conditions that the cells of the body throw off genumles; that the mule elements are the special centres of their acenundation; and that the female cells keep up the general resemblance between offspring and parent. For criticism of the numerous suppositions involved in the various theories of pungonesis, the reader is referred to the works of Galton, Ribot, Brooks, Herdman, Plarre, De Vries, and others (see bibliography); it is enough for our purpose to notice, in the light of the next step of progress, the compara-

Fact of Continuity.—As far back as 1849 Owen pointed out that in the developing germ it was possible to distinguish between those cells which became much changed to form the 'body,' and those which remained virtually nuchanged and formed the reproductive organs. The same distinction tion was emphasised by Hacekel and by Rauber, while Juger expressed his views very explicitly as follows: 'Through a great series of generations the germinal protoplasm retains its specific properties, dividing in development into a portion out of which the individual is built up, and a portion which is reserved to form the reproductive material of the mature offspring.' This reservamaterial of the mature offspring,' tion, by which the germinal protoplasm is sheltered from external or corporeal influences, and retains its specific and embryonic characters unchanged from the parent ovum, Jäger called by a now famous phrase 'the continuity of the gern-protoplasm.' Brooks (1876, 1877, 1883) was not less clear: 'The ovum gives rise to the divergent cells of the organism, but also to cells like itself. The ovarian ova of the offspring are these latter cells, or their direct unmodified descendants. The ovarian ova of the offspring thus share by direct inheritance all the properties of the fertilised ova. In the same way Galton (1872, 1875), using the term 'stirp' to express the sum total of germs, genumles, or organic units of some kind in the fertilised ovum, maintained that a certain residue is kept apart from the development of the body, to form the reproductive elements of the offspring. The history must also include Nussbann, who likewise called attention to the very early differentiation and isolation of the sex-elements to be observed in the development of some animals. The general rection industry and rected by the above notion independently suggested by the above naturalists is simple enough. At an early stage in the development of the embryo the future reproductive cells of the organism are distinguishable

from those which are forming the 'body.' The latter develop in manifold variety, and soon lose almost all likeness to the fertilised own. The former—the reproductive radiments—are not implicated in the up-building of the 'body,' remain virtually unchanged, and continue the protoplasmic tradition maltered so as to start a new organism on the same lines—i.e. with the same protoplasmic material. It is evident that a fertilised egg-cell with certain characters, a, b, c, will develop into an organism in which these characters a, b, c are variously expressed; but if at an early stage

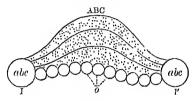


Fig. 1.

I, original ovum; ABC, body of organism to which it gives rise; o, chain of ovariam ova with properties a, b, c retained; I', thereased ovum of next generation, virtually equivalent to I.

certain cells are set apart, retaining the characters a, b, c in all their entirety, then these will be on the same footing as the original fertilised egg-cell, able like it to give rise to an organism, and necessarily to a similar organism. This exand necessarily to a similar organism. The explanation of heredity is at once so simple and so satisfactory that it becomes a most important question to determine how far the above facts are actually true among plants and animals. The answer is that they are as yet demonstrable only in a minority of cases. Thus, it is true that an early appearance or insulation of reproductive early appearance of instanton of reproductive cells, materially continuous and presumably identical with the ovum itself, has been observed in some worm-types (leeches, Sagitta, thread-worms, Polyzoa), in some Arthropods (e.g. Moina among Crustaecans, Chironomus among Insects, Phalangidæ among Arachmids), and with less distinctness in a number of other organisms. But it must be distinctly allowed that in most every it is only after distinctly allowed that in most eases it is only after development has progressed for some time that the future reproductive cells make their distinct appearance. Therefore, if distinct cellular continuity be only demonstrable in a minority, it becomes necessary to modify the generalisation. The required modification is due to Weismann, whose theory must be briefly stated. (1) A small portion of the effective substance of the fertilised egg-cell remains unchanged during the development, and serves as a foundation from which the germ-cells of the new organism are produced. (2) This important substance—the 'germ-plasma'—which keeps up continnity from one generation to another, is part of the nucleus, possesses an exceedingly complex minute structure, but has great stability, for it absorbs nonvisiment and grows enormously without the least change in its molecular constitution. (3) But while part of this special nuclear substance or germ-plasma of the egg-cell is reserved unchanged for the formation of the germ-cells of the resulting organism, part of it is changed into the nuclei of the ordinary body-cells, where, however, it some-times retains enough of its original efficiency to be able to repair serious injuries or start the development of a new organism in ascanal reproduction. Weismann has given a more complete expression to the fact of the continuity of generations than has hitherto been proposed, but it cannot be denied that there is much that is entirely hypothetical about the 'germ plasma' and its history. For thorough exposition, reference must be made to his

translated papers, and for detailed criticism to works cited in the bibliography.

Finally, we may notice a recent work by H. de Vries (1889) which seeks to combine the fact of continuity with part of the theory of pangenesis. He maintains that every characteristic of the organism is represented by a special 'pangene,' and that the germ-cells contain samples of all. This pangenetic accumulation in the germ-cells is not, however, the result of contributions traveling from the various parts of the body, but is the result of a definite, more or less direct continuity between the germ-cells and the fertilised ovant which started the organism to which they

Theories of Continuity.—It can hardly be doubted that in the more or less direct continuity between the successive sets of reproductive products lies the solution of the main problem of heredity. The germ-cells which give rise to offspring are unique in their continuity with those which gave rise to the parents and it is this continuity or the involved sameness of material which explains the production of like by like. In the simplest animals or Protozoa, organism A buds and hands on a fraction of its living matter to A1, which, being so really part and parcel of A, must grow up into a similar adult Protozoon. With higher animals the same holds true, though the continuity, as expressed in



Fig. 2.—The Relation between Reproductive Cells and the Body;

The continuous chain of dotted cells at first represents a succession of Protozon; further on, it represents the ova from which the Thodies' (undotted) are produced. At each generation a spermatozoon fertilising the liberated ovum is also indicated.

the figure, is less direct. At various levels of analysis suggestions have been made which attempt to render the fact of continuity more luminous. Thus, Professor Hering and Samuel Butler suggested about the same time a psychical aspect of hereditary continuity, according to which memory is regarded as a general function of organised matter, and the reproduction of parental likeness as due to an unconscious recollection of the past. Haeckel also emphasised the luminous metaphor of 'organic memory,' but sought to express this in terms of molecular motion. The invisible activity of the organic molecules he compares to a complex wave-motion, harmonious and persistent from generation to generation, though capable of incorporating the results of fresh experience. The periodic wave-motion of the molecules be describes characteristically as 'the perigenesis of the plastidules.' In metaphorical language, the molecules remember or persist in the rhythmic dance which they have learned. Most naturalists, however, have been content to express the continuity in terms of the cells or of the nuclei, or of yet smaller elements. Galton and Jüger, Brooks and Nussbaum, Hertwig and Herdman, Nägeli and Weismann, and others have all contributed to making the fact of continuity more precise. Hopeful also are the suggestions of Jüger, Berthold, Gantier, and Geddes, which make towards a chemical expression of the continuity between germ and germ. Within present limits it is impossible to criticise any of the above elaborations. Behind all the suggestions, whether of 'organic memory,' 'persistent wave-motion,' 'stable germplasma,' or 'constancy of chemical processes,'

there stands the great fact of the real continuity

of generations.

The Problem of Reconstruction.—How is it that the germ-cell divides and redivides as it does, and how does the development of the embryo retain its architectural constancy? Part of the answer has just been given: because the germ is virtually continuous with, and made of the same stuff as, the parent gern; therefore it must behave in precisely similar fashion. The rest of the answer involves difficulties which cannot fairly be laid on the shoulders of which cannot farry be laid on the shoulders of students of heredity, but belong to that most intricate of problems, the inchanics of development. Referring to the article Emberology for notice of some of the pioneer investigators of this problem, we can do little more than reiterate the cantion of Professor His: 'To think that "heredital" cantion of Professor His: 'To think that "nerecity" will build up organic beings without mechanical means is a piece of unscientific mysticism.' We must also protest against the carcless diction which makes 'heredity' now into a 'principle' and again into a 'power,' which calls it sometimes a 'law' and next time a 'cause.'

Inheritance of Acquired Characters.—Changes er variations in an averaging many be roughly referred.

variations in an organism may be roughly referred to three origins: (a) they may be the results of external or environmental influence; (b) they may be the outcome of use and disnse, or of functional increase or decrease; or (c) they may be due to internal, constitutional, or germinal conditions, of which one of the most important is the mingling of two different kinds of living matter in the fertilisation of the egg-cell. It is granted by all that an individual plant or animal may exhibit these three kinds of variation—environmental, functional, and organismal; and it is also true that the majority of naturalists have till recently believed that an individual gain or loss from any of the above origins might be transmitted from parent to offspring. Now, however, there is a widespread scepticism as to the inheritance or transmission of any but erganismal, congenital, or germinal variations. This scepticism, mainly emphasised by Weismann, and now prevalent among naturalists, is by no means novel. The editor, whoever he was, of Aristotle's Historia Animalium seems to have differed from his master as to the inheritance of injuries and the like. Kant also maintained the non-inheritance of extrinsic variations, and Blumenbach cantiously inclines to the same negative position. In more recent times, His expressed a strong conviction against the inheritance of acquired characters, and Pflüger is also among the sceptics. A few sentences from Galton (1875), whose far-sightedness has been insufficiently acknowledged, may be quoted. The inheritance of characters acquired during the lifetime of the parents 'includes much questionable evidence, usually difficult of verifica-We might almost reserve our belief that the structural cells can react on the sexual elements at all, and we may be confident that at the most they do so in a very faint degree—in other words, that acquired modifications are barely, if at all, inherited in the correct sense of that word.' Weismann, however, has brought the discussion to a climax. He goes even further than Galten in scopticism as to the inheritance of acquired characters, for he denies that any such transmission ocenrs. This denial is in part justified by the absence of experimental evidence to the contrary, but it is also suggested by Weismann's theory of continuity. For if a pertion of the germ-plasma of a fertilised ovum is preserved unchanged during development to form the rudiments of the reproductive cells of the new organism, and if the gorm-plasma is as stable as Weismann makes out, then there is a strong prebability that no variations produced in the body by use er disuse or by entside influences

can be transmitted. For they could only he transmitted by affecting the germ-cells, and this is a possibility which Weismann denies. He makes, positivity when α established the general connections (α) that the general may be slightly modified by changes of mutrition and growth in the body, and (b) that external continuous ditions such as climate may influence the germ cells along with, though not exactly through, the body cells. These admissions are of course different from the once prevalent opinion that changes in the body were able to affect the germ-cells, and thus become transmissible, though it may be questioned whether the two saving clanses which Weismann allows are not sufficient to damage seriously the stringency of the conclusion on which he insists throughent—that

no acquired characters are transmissible.

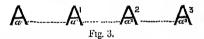
If this conclusion be true, then the influences of function and environment on the body of an organism affect the individual only, not the species. They have therefore no evelutionary value; the source of variation and the origin of adaptations must be sought elsewhere. To Weismann the sole source of evolutionary change is the intermingling of germ-plasma which occurs in fertilisation, and the condition of progress is found in the action of natural solection on the germinal variations which thus arise. There are, however, evolutionists who regard species as the necessary results of persistent variation in some definite direction, 'according to the laws of organic growth,' 'according to the con-ditions of protoplasmic change,' 'according to the apposition between untrition and reproduction,' and so on. Those who take this view, even if they admit Weismann's conclusion about acquired characters, will not find it necessary to lay the entire hirden of progress on the shoulders of natural selection.

As Weismann's conclusion that acquired characters are not transmitted is one of vast importance both theoretically and practically, it is necessary to notice some of the counter arguments. (a) There are very numerons cases on record where the effects of mulilation are said to be inherited, but it must frankly be allowed that no case is known which is not open to serious objection. Circumcision has a very ancient origin, but its effects on the Jewish race are imperceptible; while the same is true of untilations inflicted for many generations on domesticated animals. And even the numerous cases of toillose bitters analysed for marketical cases. cases of tailless kittens produced from artificially eurtailed cats have little engency in face of the fact that tailless sports may also arise from normal parents. (b) Various pathologists have brought forward instances of what appeared to them to be the transmission of acquired disease, but their arguments, as in the case of Virchow's, have evidenced misunderstanding as to Weismann's real position. There is no floubt that many malformations and available are account thanks. tions and weaknesses appear through numerons generations, but there is no evidence that such variations were not to start with germinal. If so, Weismann of course admits their transmissibility. Celour-blindness has been known to occur in the males only of six successive generations, deaf-mutism for three, finger-malformations for six, and se with harclip and cleft-palate, and with temlencies to consumption, cancer, gont, rheumatism, bleeding, &c. But nene of these prove tism, bleeding, &c. But nene of these prove the transmission of characters acquired by use or disuse, or impressed by the action of surroundings. (c) Various naturalists have brought forward what appear to them to be examples of the genuine transmission of individually acquired characters. Thus, Detruer and Hoffmann among botanists, and Eimer among zoologists, may be quoted. Even the title of Eimer's recent work, The Origin of Species, on the Busis of the Inheritance of acquired Characters, according to the Laws of Organic Growth, shows how far he is from giving up the case. It

must be confessed, however, that, in default of fresh experiments, cogent evidence to negative Weismann's scepticism is still awanting, though some belief in the inheritance of acquired characters are forthcoming, especially perhaps in connection with instinct and the growth of intelligence. (d) Another mode of argument often adopted against Weismann's conclusion is to shift the ground to the study of evolution, and there to demonstrate steps of progress which seem to many inexplicable Weismann's sole formula of natural selection acting on variations produced by the intermingling of male and female germ-plasmas in fertilisation. (c) Finally, it may be neged that the unity of the organism, the connectedness of its elements, the common medium of the blood, and other facts make it difficult to believe that the germ-plasma can live on in the reproductive organs, unchanged by any of the deep environmental and functional of the body. Those who seek to maintain the transmission of some acquired characters have obviously to submit their cases to all the stern criticism which Weismann's valuable work in-volves. But if such cases be proved, it need not, volves. But if such cases be proved, it need not, of course, lead to any departure from some form of the doctrine of continuity, on which Weismann has so well insisted, nor to a return to the supposition of travelling 'pangenes.' It does not affect the theory of continuity to admit that decisive variations produced by environment or function may send their roots deep into the system, penetrating through the body to the reproductive cells themselves. Such cases are confessedly at present dubions, but there is no a priori reason why the sex-cells should not share in the results of altered putriment and waste products, and even become nutriment and waste products, and even become saturated or infected by the characteristic chemical

results of environmental and functional variations.

Social Aspects.—All the important biological conclusions, such as that of germinal continuity, or the fact that the two parents contribute almost equal shares to the starting of the offspring, and also the scepticism about the transmission of acquired characters, have an obvious human interest. The first result enables us to realise that the germ is virtually as old as the parent, and that



A-A', the bodies of successive generations; a-a', the germ-cells between which the real continuity obtains.

the main line of hereditary connection is not that between parent and child, but 'that between the sets of elements out of which the personal parents sets of elements out of which the personal parents had been evolved, and the set out of which the personal child was evolved.' 'The main line,' Galton says, 'may be rudely likened to the chain of a necklace, and the personalities to pendants attached to the links.' To this fact social inertia is largely due, for the organic stability secured by garminal continuity birders avolution by leans germinal continuity hinders evolution by leaps and bounds, either forwards or backwards. That a good stock is pre-eminently valuable is an obvious truth. The fact that each parent contributes almost equally to the offspring emphasises the two sided responsibility of parentage: but the fact has to be corrected by Galton's statistical conclu-sion that the offspring juherits a fourth from each parent, and a sixteenth from each grand-parent. Inherited capital is thus not merely dual, but multiple, like a mosaic. Again, if we believe with Weismann that no acquired characters are inherited, we are saved from the despair which the abnormal functions and environments of our

civilisation are apt to suggest. But if the influences of function and environment do not readily become entailed or ingrained, we are all the more urged to practical action, which will secure im-proved conditions of life for each successive cuop

of individuals.

The fact that pathological conditions innate or congenital in an organism certainly tend to be transmitted suggests that popular opinion should be informed and educated as to undesirability of parentage on the part of almormal members of the community. All congenital malformations and defects due to germinal faults tend to be transmitted, and the list includes not a few of evident practical importance, such as poverty of teeth, abnormal fingers, hardlip and eleft-palate, and defective sense-organs. Still more important, however, are congenital or constitutional, as opposed to acquired, discases. Certain forms of insanity and diseases of the nervous system and sense-organs, deaf-mutism, colour-blindness, gout, mus-cular weakness, unusual liability to certain con-tagions diseases, tendencies to consumption, cancer, and dipsomania, are illustrations from a long list of inheritable diseases or weaknesses. Some diseases are transmissible with greater probability than others—i.e. in a larger percentage of cases; some appear to take a firmer grip of the constitution, and may persist for many generations, while others are more readily counteracted or 'washed out' by hygienic régime or by intercrossing; some are transmitted along tolerably constant lines—e.g. father, daughter, grandson—i.e. in alternate sexes, or father, son, grandson-i.e. along similar sexes, while others are quite irregular in their occurrence. In reference to lines of transmission, Galton is inclined to conclude that 'the female influence is inferior to that of the male in conveying ability.' In the case of a disease like consumption, which decimates our British population, it ought to be noted that in about 50 per cent. of cases it is individually acquired, not inherited; that, as the disease is bacterial, only a consumptive tendency at most is transmitted; that, even when the phthisis 'runs in families,' its propagation is sometimes due to maternal or other infection; that environmental conditions, such as the nature of the soil, seriously affect its frequency; that, with care in regard to climate, surroundings, diet, exercise, &c., even children with a consumptive tendency may rejoin the healthy stock. None the less is it inadvisable that consumptives should be parents, least of all along with other consumptives. Allowing, again, for the undeniable influences of early nutrition, upbringing, and surroundings, all authorities admit upbringing, and surroundings, all authorities admit that dipsomania or its results tend to be trans-nitted, often with the final consequence of ex-tinguishing the family. Yet, in regard to the inheritance of pathological conditions, it ought to be noticed (a) that Virchow and others have hinted at an 'optimism of pathology,' since some of the less known abnormal variations may be associated with new beginnings not without promise of possible utility; (b) that, by the intercrossing of a tainted and a relatively pure stock, a reenperative or counteractive influence may act so as to produce comparatively healthy offspring, thus illustrating what may be called the 'forgiveness of nature.'

Social Inheritance.—The widest problems of

social Inheritance.—Inc which problems of heredity are raised when we substitute 'fraternities' for individuals, or make the transition to social inheritance. For lack of reliable statistics, and experts capable of wielding the statistical method, the complex problems of the relation between successive generations of a society have rarely been essayed. The most important pioneering is that of Goltzer, whose prious papers have here is that of Galton, whose unique papers have been recently summed up in his Natural Inheritance

(1889), a work which, in its emphatic transition from the study of individuals to that of fraternities, well illustrates that science is indeed 'a social phenomenon.' Galton derived his data from his well-known Records of Family Faculties, especially concerning stature, eye-colour, and artistic powers; and his work has been in great part an application of the statistical law of Frequency of Error to the above-mentioned records. If we leave out of account the problem of estimating the share contributed to the effspring by each ancestor, and that ef determining accurately the degrees of near kinship, the great problem of Galtan's work relates to the curious regularity observed in the peculiarities of great populations during a long series of generations. The large do not always beget the large, nor the small the small; but yet the observed proportion between the large and the small, in each degree of size and in every quality, hardly varies from one generation to another. In short, a specific average is sustained. This is not because each individual leaves his like helmid him, for this is not hardly not the is certainly not the ease. It is rather due to the is certainly not the ease. It is rather the to the fact of a regular regression or deviation which brings the offspring of extraordinary parents in a definite ratio nearer the average of the stock. A few sentences must be queted to explain this 'law of regression' which (falton has established, 'However paradoxical it may appear at irst sight; it is therewisely a recognity fact, and one that it theoretically a necessary fact, and one that is clearly confirmed by observation, that the stature of the adult offspring must on the whole be more medioere than the stature of their parents—that is mediaters than the statute of their parents—that is to say, more near to the median stature of the general population. Or again, 'each peculiarity in a man is shared by his kinsmen, but on the average in a less degree. It is reduced to a definite average in a less degree. It is reduced to a definite fraction of its amount, quite independently of what its amount might be. The fraction differs in different orders of kinship, becoming smaller as they are more remote.' Yet it must not be supposed that the value of a good stock is denied or underestimated by Galton, for he shows how the offspring of two ordinary members of a gifted stock will not market like the effective of a consideration. will not regress like the offspring of a couple equal in gifts to the former, but helonging to a poor stock, above the average of which they have risen. Yet it is true that the fact of regression tells against the full hereditary transmission of any signal talent. Children are not likely to differ from medicerity so widely as their parents. 'The unere bountifully a parent is gifted by nature, the unere rare will be his good-fortune if he begets a son who is as richly endowed as himself, and still unere se if he has a son who is endowed more largely.' The other senant of the age, must not however he over son who is endowed more argely. The other aspect of the ease must not, however, be overlooked. 'The law,' Galton says, 'is even-handed; it levies an equal succession-tax on the transmission of badness as of goedness. If it discourages the extravagant hopes of a gifted parent that his children will inherit all his powers, it no less discountenances extravagant fears that they will inherit all his goedness and discourt and they will be greatly one and discourse.' inherit all his weakness and disease.

The study of individual inheritance, as in Galton's Hereditary Genius, may tend to develop an aristocratic and justifiable pride of race when a gifted lineage is domonstrable for generations, or it may tend to absolute despair if the recerds of family disease be subjected to investigation. The study of social inheritance is at once more democratic and less pessimistic. The nation is a vast fraternity, with an average towards which the descendants of all nobles gradually tend, but to which the offspring of the under-average will also approximate. It seems a corollary that practical measures which beneficently affect large numbers are mere hopeful than those which artificially select a few. It should be noticed also that, if Weismann's scepticism be

thoroughly justified, it by no means leads us to depreciate the effect of work and surroundings, but emphatically increases the urgency of conserving healthful function and stimulating environments of every kind—all the more important if their influences must needs be repeated on each fresh generation. Ner should one forget how much a plastic physical and mental education (along with which M. Guyan includes hypnotic suggestion) may do to counteract disadvantageons inherited qualities, or angment those which are beneficial. Finally, it will be allowed that much requires to be done in educating public opinion, not only to recognise the results of the science of heredity, but also to admit the value and necessity of the correspending art which Mr Galton calls 'engenics.'

admit the value and necessity of the corresponding art which Mr Galton calls 'engenics.'

See Biology, Embredogy, Enytronnent, Evelution, &c. For bibliography, J. Arthur Thomson, 'History and Theory of Heredity,' Proc. Roy. Soc. Edin. (1889); E. Roth, Die Thatsachen der Vereibung (2d ed. Benlin, 1885), See also W. K. Brooks, The Law of Heredity (Enltimote, 1883); S. Butler, Life and Habit (Lond. 1878); C. Darwin, Variation under Domestication (Lond. 1888); G. H. T. Eimer, Die Entstehung der Arten (Jena, 1888); F. Galton, Natural Inheritance (Lond. 1889; and his other works there noticed); E. Hacekel, Generalle Morphologie (Berlin, 1866), Die Perigensis der Plastidule (Berlin, 1876); W. A. Hordman, Philos. Soc. Liverpool (1883); E. Hering, Das Gedüchtniss als eine allgemeine Funktion der organischen Materic (Vien. 1876); O. Hertwig, Lehrbuch der Entwicklungsgeschichte (Jena, 1888); W. His, Unsere Körperform (Lein, 1875); G. Jager, Zoologische Briefe (Vien. 1876; Kosmos, 1877, 1879); Zeitschr. wiss. Zool. xxvii. Elehbuch der Zoologie (Leip. 1878); Prosper Lucas, Traité philosoph, et physiol. de VHéridité naturelle (Paris, 1847; the first sorious treatise on heredity); C. Nageli, Mechanisch-physiolog. Theorie der Abstammungslehre (Munich, 1884); Th. Inbot, L'Hérédité psychologique (3d ed. Paris; trans. Lond. 1875); H. Spencer, Principles of Biology (Lond. 1866); R. Virchow, Descendene und Pathologie, Virchow's Archiv. cili. (1886); H. de Vries, Intractulure Pangenesis (Jena, 1889); A. Woismann, Papers on Heredity (1882–1889); trans. Oxf. 1889). For pathological inheritance, see, conveniently, Felkin, 'Heredity in Healtin to education, see M. Gnyan, Education et Hérédité (Paris, 1880). Por social inheritance. For critiques of Weismann, soe Einner, Virchow, opp. cit., Spencer, Factors of Organio Evolution (Lond. 1885); M'Kendrick, General Physiology (Glasgow, 1888); Vines, Nature, x. pp. 621–26; Turner, Nature, xl. pp. 526–33; and J. R. Thonson, loco citato.

Hereford, the county town of Herefordshire, on the left bank of the Wye, 144 miles by rail WNW. of London, and 51 S. of Shrewsbury. Its noble eathedral was built between 1079 and 1535, and so exhibits every variety of style from Neman te Perpendicular. Measnring 342 feet by 146 across the transept, it has a central tower 165 feet high. It suffered much at Wyatt's hands after the fall of the western tower in 1786, but has been judiciously restored by Cottingham (1841-52) and Sir G. G. Scott (1856-63). Special features are the elaborate metal-work screen, the shrine of St Thomas de Cantilupe (1282), the organ (originally by Renatus Harris), and the 'Mappa Mindi,' er map of the world (c. 1314), a fac-simile of which was published in 1872. Hereferd, with Gloncester and Worcester, is one of the meeting-places of the 'Three Chois.' Other edifies are the Doric shire hall (1817), in front of it a statue (1864) of Sir G. C. Lewis; the corn exchange (1858), the episcopal palace (formed out of a Norman hall), the college of vicars choral (c. 1474), the 14th-century grammar-school, the half-timbered 'Old House,' the guildhall, the butchers' guildhall, the Coningsby Hospital (1610).

the free library (1876), &c. The Nel-on column (1807) marks the site of the almost obliterated castle; and the White Cross, one mile out on the Hay road, commemorates the Black Death of 1847. Nell Gwynne and Garrick were natives. A large trade is done in agricultural produce; and the rosegardens of Hereford are famous. The seat of a bishopric from 676, the city was chartered by Henry III., and returned two members to parliament—now only one—from Edward L's reign till 1885. It has stood many sieges from Stephen's time down to the Great Rebellion. Pop. (1851) 12,108; (1881) 19,822. See works by Britton (1831) and Havergal (1869).

Herefordshire, an inland county in the west of England, is bounded on the N. by Shropshire, E. by Worcester, S. by Gloucester and Monmouth, and W. by South Wales. In length it measures 38 miles, in breadth 35, and its area is 833 sq. m. Pop. (1801) 89,191; (1841) 113,272; (1871) 125,370; (1831) 121,062. The surface is mostly billy with occasional valleys opening into widespread plains, the chief hill-ranges being those of the Hatterell or Black Mountains (2631 feet) on the south-western, and the Malvern Hills (1395) on the eastern boundary of the county. It is watered by several streams, the principal of which are the Teme, and the Wye with its affluents the Lagg, the Arrow, and the Monnow, alike noted for their fishing, and the Wye in particular for its picturesque scenery. The climate of Herefordshire varies with the elevation and exposure, but, as attested by the general longevity of the inhabitants, is on the whole very healthy. The soil, which is for the most part a deep, heavy, red loam, with a substratum in many places of limestone, produces good crops of grain, principally wheat, and is favourable to the growth of timber. Hops are largely enlitvated, and the area of the orehards with which the county abounds exceeds 27,000 acres. Herefordshire is celebrated for its cattle, and its horses and sheep are in a lesser degree well known. Cider-making is the principal manufacture, and malting is also carried on; whilst sandstone, limestone, and marble have been largely quarried. The county, divided into 11 hundreds and 258 parishes, returns three members to parliament, one for each of its two divisions (Leominster and Ross), and one for the city of Hereford. The principal towns are Hereford, Leominster, Ross, and Ledbury.

The historical events connected with the county are soon told, Its earliest inhabitants were the Silures, who for long withstood an invasion of the Romans, but, being at last (about 73 A.D.) overcome, they retired into the fastnesses of Wales. During the so-called Heptarchy it was incorporated with Mercia, and subsequently from its position on the Welsh border was—a portion of the county being included in the debateable land called 'the Marches' the scene of prolonged contests between the rivalclaimants. In 793 A.D. Ethelbert, king of the East Angles, was treacherously unrilered at Sutton, near Hereford; and in 1461 at Mortimer's Cross, 4 miles north-west of Leominster, the decisive battle took place between the houses of York and Lancaster which resulted in the defeat of the latter and the establishment of Edward IV, on the throne of England. Subsequently Herefordshire suffered much during the civil broils in the time of Charles II. Of places of interest in the county mention may be made of Offa's Dyke (q.v.); of Dorstone, where there is a large and enrious cromlech known as 'Arthur's Stone; of the ruins of Clifford Castle, the birth-place of 'Fair Rosamond,' Henry II.'s mistress; and of the Hereford Beacon on the Malvern Hills, on which is a eamp, the construction of which is ascribed to Caractacus. Robert Devereux, Earl

of Essex (Queen Elizabeth's favourite); Richard Whittington, 'thrice Lord Mayor of London;' David Garrick, the actor; John Kyrle ('The Man of Ross'); and Nell Gwynne, the favourite of Charles II., were all natives of Herefordshire; and Mrs Browning, the poetess, passed her childhood there. See the Quarterly Review for 1879, and works there cited. For the Earls of Hereford, see BOHUM.

Herencia, a town of Spain, 40 miles NE. of Cindad Real, carries on manufactures of soap. Pop. 6000.

Hereros. See DAMARALAND.

Heresy (Gr. hairesis) primitively means a choice or election, and in its application to religious belief is used to designate as well the act of choosing for one's self, and maintaining opinions contrary to the authorised teaching of the religious community to which one's obedience is due, as also the heterodox opinions thus adopted and the party which may have adopted them. In the Acts of the Apostles (see v. 17, xv. 5, xxiv. 5, xxviii. 22) the word seems to be used of a sect or party, apart from the consideration of its character, whether good or bad; but in the Epistles and in the early Christian writers it is almost invariably used in a bad sense, which is the sense uniformly accepted in all subsequent theological literature. Roman Catholic writers, regarding the authority of their own church as supreme and final, apply the name of heresy to any formal denial of a doctrine proposed by the Roman Catholic Church as necessary to be believed. Protestant writers seldom use the word, except in relation to what each sect regards as the essentials of Christian faith.

Even in the apostolic times heresics had arisen in the church, and before the Council of Nice the catalogue of sects had already swelled to considerable dimensions. The chief carly heresics are reducible to two classes: (1) those which attempted to associate the Christian doctrines with Judaism; (2) those which ingrafted Christianity upon the Gentile religions or the Gentile philosophies.

From the very date of the establishment of Christianity in the Roman empire heresy appears to have been regarded as a crime cognisable by the civil law; and Constantine enacted several severe laws for its repression, which were continued and extended by his successors, and were collected into a single title, De Harcticis, in the Justinian code. The penalties of heresy ordained by these enactments are very severe, extending to corporal punishment, and even to death; and they all proceed on the distinct assumption that a crime against religion is a crime against the state. These enactments of the Roman law were embodied in the various codes of the European kingdoms; in English law heresy consisted in holding opinions contrary to Catholic faith and the determination of Holy Church. By common law the offender was to be tried in the provincial synod by the archbishop and his conneil, and, after conviction, was to be given up to the king to be dealt with at his pleasure. But the statute 2 Hen. IV. chap. 15 (De harctico comburendo) empowered the diocesan to take cognisance of heresy, and, on conviction, to band over the criminal directly, and without waiting for the king's writ, to the sheriff or other competent officer. This statute continued practically in force, with certain modifications, till the 29 Charles II. chap. 9, since which time heresy is left entirely to the cognisance of the ecclesiastical courts. The article BLAS-PHEMY deals with an important cognate subject.

In the case of clergy of the Church of England, under a statute of 1571 (now confined to its narrowest effect by a series of judgments) any distinct contradiction of the Articles, or obvious evasion of

them, subjects the offender to deprivation of his benefice. The supreme authority is the Judicial Committee of the Privy-conneil, which construes the articles and formularies according to the legal rules for the interpretation of statutes (see Ecclesiastical Courts; and England, Church of). In the Preshyterian churches a heretical minister is usually tried by his preshytery, and may be deposed from the ministry by the General Assembly.

For the history and literature of heretical seets, consult the very numerous articles in this work on the various bodies of heretics, as Albiguenses, Ardus, Ebionites, Essenes, Grostics, Manielmans, Mortanus, Mystics, Pelagius, &c. See also the articles Baur, Church History, Dominicans, Excommunication, Inquisition, Persecution; the standard ecclesiastical historians; Arnold's Ketzerhistorie (1699); Tiahn's Ketzer im Mutti-alter (1850); and Hilgenfeld's Ketzeryeschichte des Urchristentums (1883).

Hereward, commonly called Hereward The Wake, was an English yeoman or squire who held the Isle of Ely against William the Conqueror in 1070-71. When William had succeeded in encompassing the English patriots and penetrating to their camp of refuge, Hereward, scorning to yield, cut his way through to the fastnesses of the swampy fens northwards. It is probable that he subsequently became reconciled to William. He held property in Warwickshire and probably also in Woreestershire. The noble lineage assigned to Hereward in Charles Kingsley's romance of Hereward the Wake (1866) has been shown by Freeman (Norman Conquest, vol. iv.) to be destitate of historic foundation.

Herford, a town in the Prussian province of Westphalia, situated close to the frontier of Lippe-Detnold, 59 miles SW of Hanover by rail. Flax and cotton spinning, linen-weaving, and the mannfacture of sugar and confections are carried on. Pop. (1875) 12,012; (1885) 15,902.

Hergest, The Red Book of, the name usually given to a great manuscript, the chief repository of Welsh literature, now preserved in the library of Jesus College, Oxford. It owes its name to Hergest Court, a seat of the Vanghans, for whom most likely it was originally compiled. It is a folio volume of 360 vellum leaves written in double columns, from the beginning of the 14th to the middle of the 15th century. Its eleven prose tales were printed by Lady Charlotte Great, together with the romance of the Hans Tuliesin, under the name of Mubinogion, although in the Red Book itself that name is applied to four only.

Heriot, in English law, is a kind of fine due to the lord of a manor on the death of a person holding land of the manor, and consists of the best beast, jewel, or chattel that belonged to the deceased. The lord can enforce this right by action, or soize it brevi manu. Heriots probably originated in the return of the horse and arms lent by a fendal lord to his tenant; they are now seldom paid in respect of freehold lands, and they are regarded as one of the most vexatious incidents of copyhold tenure. See COPYHOLD.

Meriot, George, founder of a magnificent school at Edinburgh, was a descendant of the Heriots of Trabronn, East Lothian, and was born at Edinburgh in June 1563. Commoneing business as a galdsmith in that city in 1586, he was, after being cloven years in business, appointed goldsmith to Anne of Denmark, consort of James VI. of Sectland, and soon after to the king. On James's accession, in 1603, to the English throne, Heriot went to London, where, as court-jeweller and hanker, he amassed considerable riches. He died at London, February 12, 1624, without issue, and bequeathed the residue of his property, amounting to £23,625,

to found and endow a hospital (or school) in Edinburgh for the maintenance and education of the sons of poor deceased or decayed burgesses. Heriot's Hospital was completed from a design, it is believed, by Inigo Jones, in 1659. In 1837 an act of parliament was procured for expending surplus funds which had accumulated in the hands of the trustees in the erection of free schools for poor children (ultimately sixteen in all). The Act of 1885, at which time the annual revenue of the trust amounted to £26,502, reconstituted the hospital as a middle-class and technical school, and closed the free schools in the city. The Heriot-Watt College was also subsidised from the Heriot funds, to provide for older students tharough scientific and technical instruction at moderate fees. Besides, there are valuable bursaries awarded for the promotion of secondary and higher education, tenable at George Heriot's Hospital School, the High School, the Heriot-Watt College, and the university. And a sum is expended in providing free education, books, &c. for poor children attending public or state-aided schools. The revenue for 1889 was £31,159, and it is estimated that it will ultimately increase to little short of £50,000. 'Jingling Geordie' figures in Scott's Fortunes of Nigel. See History of Heriot's Hospital, by W. Steven (new ed. 1859).

Herisau, the largest town of the Swiss canton of Appenzell, in the Ausser Roden division, stands 2549 feet above sea-level, 5½ miles SW. of St Gall by rail. It is a thriving seat of the cotton manufactures. Pop. 11,082.

Heristal, or Herstal, an industrial town of Belgium, on the Meuse, immediately NE. of Liege, of which it is virtually a suburb. It is mostly inhabited by workmen, who find employment in the coal-mines and the iron and steel works. Ruins still exist of the eastle of Heristal, the birthplace of Pepin, the mayor of the palace; and his greatgrandson Charlemagne frequently resided here. Pop. 11,918.

Heritable and Movable, a Scotch law-phrase denoting the distinction of things which go to the heir and to the excentors respectively. Movables include such property as passes to the exceutor in succession, or is removable by the tenant on leaving his farm, or as comes under the operation of the law of the owner's domicile in bankruptey and succession. Money and household furniture may be taken as examples. Heritable subjects are such as go to the heir in succession, or go with land to a buyer, and are regulated by the territorial law. The best examples are land and houses. The gearing of engines and all machinery fixed to the floor are also heritable. The distinction corresponds to a certain extent to the phrase 'Heir and Executor' in England.

HERITABLE BOND, in Scotch law, is a personal bond for a sum of money, with a real right of annual rent payable out of land, and accompanied by a conveyance of the lands themselves in security. The usual deed is now a bond and disposition in security, corresponding to the English Mortgage (q.v.).

HERITABLE SECURITIES, the name given in the law of Scothand to what are called mortgages and charges on land in England. These were formerly distinguished into wadset, infeftment of annual rent, heritable bond, bond and disposition in security, and absolute disposition with backbond, and also reserved burdens on land. By the constitution of a heritable security the debt secured becomes a burden on the land, entitling the creditor to appropriate the rents until the debt is paid. This right of the creditor remains entire against the land, no matter into whose hands it passes,

and without affecting or being affected by the fendal titles, which confer and transmit the radical right to the land. In Scotland the principal heritable security is now called the bond and disposition in security, which consists of an abligation to pay the debt, and a disposition to the creditor, by way of scenrity till the debt is paid. The bond must be registered in the Register of Sasines to complete the creditor's title, and it is assignable to a third party. A power is always given to the creditor to sell the estate if the principal or interest is not paid, in which case the creditor must account for the surplus after paying himself his debt.

Heritable Jurisdictions, a remarkable class of jurisdictions held hereditarily from the crown in Scotland, and abolished in 1748. These jurisdictions amounted to upwards of a fundred in number, and consisted of sherifiships, stewartrics, constabilizing, but principally of regalities and bailieries, with some offices of distinction. One of the more important was the office of Lord Justice-general and the lordship of Argyll and the Isles, both belonging to the family of Argyll. In virtue of their hereditary rights, the possessors of these jurisdictions exercised an arbitrary power over vassals and others within the limits of their domain, and could punish them by fines, sconging, imprisonment, and even in some cases put them to death, without interference of the common law. As repugnant to social policy, and more particularly with the view of extinguishing the authority of Highland chiefs over their claus, these heritable jurisdictions were abolished; the possessors receiving payment for the assumed value of their rights. Argyll alone received £21,000 as an indemnity, and altogether there was paid by government £152,037, 12s. 2d. The abolition of these odious jurisdictions being followed by the appointment of sheriffs on a proper footing, this great legislative act marks an important era in the history of Scotland. Sec the Duke of Argyll's Scotland as it was and as it is (1887).

Meritor, in the law of Scotland, is the owner of land in a parish liable to public burdens. The heritors, collectively, have vested in them the fee of the church and churchyard; they repair the parish church and manse, or rebuild them where necessary, and before the Education Act (1872) elected the parish schoolmaster.

Her'komer, Hubert, artist, was born at Waal, in Bavaria, in 1849, the son of a woodcarver who came to England in 1857. At the age of thirteen he gained a medal at the Southampton art school, and afterwards studied for a few months at Munich and Sonth Kensington. In 1870 he settled in London, where, besides painting, he employed himself in preparing designs for the Graphic. He has since exhibited a large number of works in water-colour and oil, including figure-subjects and portraits. His best picture is 'The Last Muster' (1875), a picture of Chelsea pensioners in chapel. In 1879 he was elected A.R.A., and in 1885 Stade professor at Oxford, being reelected in 1889; he is also an honorary member of the academies of Vienna and Berlin, and an officer (1889) of the Légion d'Honneur. Besides founding a school of art at Bushey (q.v.), he has applied himself with more or less success to the work of the engraver, the wood-carver, and the iron-smith, the architect, the magazine-writer, the playwright and the composer, the singer and the actor.

Hermæ. See Hermes, Alcibiades.

Hermandad, The (Sp., 'brotherhood'), had its rise in an association of the principal cities of Castile against the nobles who in 1282, under Prince

Sancho, rose against Alfonso X. When Sancho succeeded to the throne (1295) the league was more firmly organised throughout Castile and Leon, with the express object of resisting the tyranny and exactions of the crown-vassals and nobles. Ferdinand and Isabella, in order to curb the power of their fendatories, first favoured the association and ultimately (in 1485) gave it a legal status under the name of the Hermandad. It now constituted a confederation of the entire burgher class for police and judicial purposes, with local courts and an annual meeting of deputies from all the cities; and the sovereigns, adopting its members as a standing force to counterbalance the followers of the fendal lords, put themselves at the head of the association, placed it at the service of the city magistrates, and employed it both in quelling disturbances and in seizing confiscated properties. The introduction of a regular standing anny enabled the crown to free itself from this dependence on the towns; and with the decay of the Hermandad disappeared the last vestige of popular freedom.

Hermann. See Arminius.

Hermann, Johann Gottfreid Jakob, a German classical scholar, was born at Leinzig, 28th November 1772. He studied there and at Jena, and was made in 1798 extra-ordinary professor of Philosophy at Leinzig; in 1803, ordinary professor of Poetry. He died as senior of the university, 31st December 1848. The first department which he began to cultivate on original principles was the science of classical metre, of which he attempted to develop a philosophical theory, based upon the categories of Kant; on this subject he wrote, besides his Handbuch der Metrik (1798), several Latin treatises, among which the Epitomo Doctrina Metrica (1818) reached a fourth edition in 1869. Of wider importance, however, was the new method which he introduced into the treatment of Greek grammar, and which has had its influence on the grammar of Latin and of German. The principles of this method are explicitly developed in De Emendanda Ratione Greeke Grammatica (1801), and are practically illustrated in his numerous excellent editions of the ancient classics. Hermann's power of dealing with chronological, topographical, and personal questions is shown in his Opuscula (8 vols. 1827-77), which also contain some poems breathing the spirit of Roman poetry. See Memoirs by Jahn (1849) and Köchly (1874).

Hermannstadt (Lat. Cibinium, Hung. Nagy-Szeben), a town of Hungary, formerly capital of Transylvania, is situated at the terminus of a branch-line (28 miles long), 370 miles SE. of Pesth. It consists of an upper and a lower town, the walls, towers, and bastions formerly surrounding which have only recently been demolished. Hermannstadt is the seat of a Greek archbishop and of a 'Saxon' university. The fine Bruckenthal palace contains a picture-gallery, numismatic, antiquarian, and unineral collections, and a library of some 30,000 volumes. Tanning, wax-bleaching, and the making of cloth, paper, candles, sugar, and hats are carried on. Pop. (1881) 19,446, of whom 14,000 are Germans. Hermannstadt was originally the scat of a German colony, founded in the reign of Gesa II. (1141-61), and was at first called Villa Hermanni. It has endured several sieges from the Turks (1438 and 1442), as well as one from the followers of John Zapolya (1526). It also suffered at the hands of Gabriel Bathori in 1610, and again from both combatants during the Russo-Hungarian war of 1849.

Hermaphroditism, the combination of the essential male and female functions and structures

in one organism, as in most flowering plants, or in many lower animals, such as earthworm, leech, or snail. The name is derived from the table of the nuion into one of the bodies of Hermaphroditus, son of Hernes and Aphrodite, and the nymph Sulmacis (see Ovid's Metamorphoses, iv. 347). The combination of two sexes in one occurs, however, in various degrees, the bisexnality heing sometimes very intimate, and in other cases only superficial. (a) It is probable that many animals -e.g. frogs, which are unisexual in adult life-pass through a period of enthryonic hermaphroditism, early nutrition having much to do with the more or less complete predominance of one sex over the other. (b) Among fishes and amphibians and elsewhere, cusual or abnormal hermaphroditism is not infrequent, the animal having for instance an overy on one side and a testis on the other. (c) In other cases only one organ is developed, and one sex emphatically predominates in the organism, not, however, without hints of the other. This partial hermaphroditism is usually an execution, as when a butterfly has its wings coloured like those of the female on one side, like those of the male on the other. Frogs and toads also illustrate enrious combinations, which do not, however, conflict with the predominance of the egg-producing or the sperm-producing function as the case may be. (d) An apparent, but in reality felse hormaphroditism may result in the higher animals where, by malformation or rudimentary development of the external reproductive organs, a manimal in reality quite female may look like a male, or vice

(c) Normal adult hermaphroditism, where egg-(r) Normal deatt normaphroatism, where eggproducing and sperm-producing functions go on
(usually at different times), is rare among higher
animals—occurring in Chryophrys and Serrams
among fishes, in the hagfish Myxine, and in all
the Tunicata. It is, however, of frequent occurrence in the invertebrate series—among smalls,
higher invisions and the series—among smalls, hivalves, cirripedes, worm types, calcuterates, and sponges. It is most familiar in our common flowering plants, which are often called mono-

clinous or perfect.

Hermaphroditism may be more or less intimate. Thus, as an entire plant an Arum is hermaphradite, with female flowers below and male flowers above; but the hermaphroditism is more intimate in a buttereng, where each flower bears male and female organs, or yet more intimate in an orchid, where stamens and carpels are united. So a leech, with ovaries quite distinct from the testes, is less intimately hermaphrodite than a snail, where within the same small organ both kinds of sex

elements are produced.

The male and female elements, whether in phanerogam or invertebrate, are rarely, if ever, matured at the same time. Such a want of timekeeping' is called in botanical language dichogamy, and is one of the conditions which tend to prevent self-fertilisation. Protandrons dichogany, where the stamens take the lead, is much commoter than protogynous dichaganty, where the carpels mature first. This is also true of animals, and is more marked when the hermaphroditism is intimate, as in snail or oyster. The hagfish seems to be predominantly male till it attains a certain size; and so in the emious thread-worm Angio-stomum and in the crustacean Cymotheidae the organs are first male and then after a while female. In the cirripeds and Myzostomata, the majority of which are bisexual, pigmy or complemental males are in some cases associated with the hermaphrodites, or in the case of the barnacles (in which separate sexes sometimes occur) even with some of the females.

Alike in plants and in animals, though herma-

phroditism is common, self-fertilisation is tale. does occur in not a few common flowers, and in tapeworms, some flukes, and a few other animals, but is without doubt exceptional.

Hermanhroditism is commonest in sluggish animals (e.g. flat-worms, tardigrades, snails, er in fixed animals (e.g. sponges, corals, Polyzoa, bivalves, Tunicates), or in parasitic animals with a plethora of untrition and little exertion (e.g.

flukes, tapeworms, leeches, Myzostomata).

As to its origin, hermaphroditism is probably the lower, more primitive condition from which that of evolved. In alternating rhythms eggs and sperms were produced, gradually the areas of their respective formation were restricted, by and by one tendency predominated in the organism, and separate males and females were established. If embryonic hermaphroditism be, as some believe, of general occurrence, then most organisms recapitulate this evolution of separate sex in their individual life-history. If it be allowed that bermaphroditism was the primitive condition, then the phrodusin was the printitive condition, then the cases now existing indicate either persistence or reversion. See Embervology, Reproduction, Sex; and Geddes and Thomson, The Evolution of Sex (Lond. 1889). For aberrant hermaphroditism in human adults, see Todd and Bowman's Cyclop. of Anat. and Physiol., vol. ii.

Hermas, as the anthor of the well-known early treatiso called *The Shepherd*, is usually reckoned one of the Apostolic Fathers (q.v.). The work is quoted as inspired by Irenaus and Clement of Alexandria. To the Montanist Tertullian it is that apoeryphal Shepherd of the adulterers; but Engaling while he please it in his list of specific or anti-Enselins, while he places it in his list of spurious or rejected books, witnesses that it had been read publicly in the churches. And indeed the 'commandments' were read here and there in the Eastern Church from the 4th to the 15th century. Eastern Church from the son of Scripture. The though nowhere with the honour of Scripture. The date and the authorship are both in dispute. suggestion first advanced by Origen, in the 3d century, that the Hermas mentioned in Romanmight he the author, may be dismissed in company with the assertion of the Ethiopic scribe that Hermas was none other than St Paul. The state-ment of the writer of the Muratorian Fragment has been generally accepted, that Hermas was the brother of Pius I., Bishop of Rome about the middle of the 2d century, and that he wrote during his brother's episcopate; but the form of church government that appears in The Shepherd is against this tradition, as perhaps is also the jealonsy the writer displays of those who are ecclesiastically his superiors; and moreover the treatise was already in general use considerably before the and of the continu. From these and before the end of the century. From these and other considerations there has been in recent years a tendency to throw the date back to the beginning of the 2d century, and to identify a certain Clement who is mentioned with Clement (q.v.) of Rome. This last point is a more assumption, but in favour of the carlier date is most of the internal evidence, as well as the fact that the book was read in public—an honour restricted in every other instance to writings accepted as those of the Apostles or their immediate disciples; against it are the allusions to the persecutions suffered by the Christians, the condition of the Roman Church, and the absence of all reference to Judaising Christiaus. Finally, Donaldson's theory that the name Hermas is fictitions, and the whole work an allegory, appears to be based on a misconception. The treatise, which is divided into three parts—visions, commandments, and similitudes—contains little of positive dogmatic teaching, but is an interesting monument of early Christian thought; it was intended primarily

to rebuke the worldliness that had come upon the church, and to turn sinners to repentance.

Latin translations were in use before the end of the 2d century, and for long the work was known only through a score of Ms. copies of one of these versions. A second a score of MS, copies of one of these versions. A second Latin version has been discovered, however, as well as an Ethiopic version, found by D'Abhadie in 1847, and edited by him with a Latin translation (Leip. 1860). Of the Greek text the Codex Sinaticus supplies about one-fourth, to nearly the ond of the fourth commandment; the rest, except about seven short chapters, is in the Athos MS. Considerable portions are found in Pseudo-Athanasius and Anticolus Palestinavic and have becomed active. Considerable portions are found in Pseudo-Athanasius and Antiochus Palæstinensis, who have borrowed extensively from Hernas without acknowledgment. In 1890 the discovery of a new Greek codex, contemporary with the Sinatticus, and containing the whole of Hermas, was announced. There is a 'complete' Greek text by Hilgenfeld (1888), who has also edited the Latin form (1873); and a Collution of the Athos Codex has been made by Dr Spyr. P. Lambros (trans. with preface, &c., by F. A. Robinson, Camb. 1888). There is a good edition of Latin and Greek by Gebhardt and Harnack (1877). See also Zahn, Der Hirt des Hermas (1868); Donaldson, The Apostolicul Fathers (1874); Salmon's Introduction to the New Testament (4th ed. 1889); and Johns Hopkins University Circulars, ii. 75 and iv. 23.

Hermeneutics. See Exegesis.

Hermes, on the testimony of art and literature alike, was more intimately connected with the everyday life of the Greeks than was any other of their gods. In the country his images were erected on mountains, in caves, by the side of streams, hy the roadside, where they served as finger-poets, and on the maches, where they served to delimit the frontier. In towns the gate by which one entered the city and the door by which one entered a honse were under the wortenting of an image of this deity. were under the protection of an image of this deity. The streets of the city, like the roads of the country, were marked by statues of Hermes (Lat. Herme). Inside the house as well as outside its doors the likeness of Hermes was to be found. The agora or market place of every city was especially under the protection of this deity, and possessed a statue of him. The gymnasium and paliestra also were decorted. ated with likenesses of their patron god Hermes. Finally, in the very grave the Greek was accompanied by Hermes, the conductor of souls.

From what has been said it is obvious that the functions ascribed to Hermes, the son of Zeus and

Maia, must have been very considerable in number and range. In the first place, he was regarded unanimously and from the beginning as the herald and messenger of Zens, and in virtue of this character he is represented in art with the herald's staff, with wings on his feet or shoulders, and a traveller's hat of felt, low in the crown and broad in the brim, on his head. It seems natural in the next place to attribute Hermes' function as god of the training ground to the speed of foot which he as the herald of the gods was credited with. Again, Hermes was the patron of thieves, and he himself, according to the 'Hymn to Hermes,' commenced a thief's career by stealing the oxen of Apollo when he was but a few hours old. At the same early age, according to the same authority. Hermes invented the lyre, which he constructed out of the shell of a tortoise. The invention of the flute and the syrinx also was ascribed to this deity. The function of conducting the spirits of the departed to the next world, and the closely-related function of bringing dreams to mortals, probably were part of his duties as the messenger of the were part of his duties as the messenger of the gods, but are of so much importance that they need separate mention. A function apparently quite miconnected with any already mentioned is that of securing fertility to flocks and herds, and generally of preserving health. We have already noticed that roads and streets in Greece were under the sense in are of Henrice, we want then correct especial care of Hermes; we must then connect

this fact with the circumstance that Hermes was the patron of travellers, merchants, and commerce generally. Finally, Hermes was the god of unexpected good luck; what we call a godsend the Greeks called a Hermaion.

As to the origin of Herrics comparative mythologists are disagreed, though perhaps not more so in his case than in the case of other gods. He has been regarded as the god of fertilising rain, as the evening twilight or the light of dawn, as a cloudgod, as a nether-world god, and of course as a solar god. It is objected to these explanations that they only account for some and not for all of his func-tions. Thus, the fertilising rain would explain his function of causing fertility (were it not for the fact that it is the fertility of flocks and herds that Hermes is concerned with), and the pleasant sound of the falling rain might explain his connection with music. But the other functions find no explanation or but a forced one in this theory. It has theen therefore argued (by Roccher, Hernes der Windgott) that Hernes is a wind-god. The wind is the divine messenger sent from Zeus (the sky) to man. The wind sweeps down from the mountaintons, where again the images of Hermes were placed. The swiftness of the wind is indicated by he wings on the heels or the shoulders of the god The winds carry things away, even as the thief Hermes. The wind, like Hermes the inventor of the finte and the lyre, makes sweet music. Ghosts that are but thin air, belong to the domain of the air, and are under the dominion of the wind god. air, and are under the dominion of the wind-god. The gentle zephyrs not only favour the growth of plants, but, according to ancient notions, conduced to the fertility of flocks and herds. The winds also blow away foul air and miasma, and the wind-god is therefore properly the god of health. The changing wind has ever been the symbol of fickle fortune and unexpected linck, and Hernes is the god of unexpected good-fortune. Travellers are especially dependent on wind and weather, and hence on Hermes. Again, various epithets which are applied to this god and have caused much trouble to scholars can be explained on this theory. Argeiphontes is the god who makes the sky clear, as does the wind. Diaktoros is the chaser. The name Hermes itself, or rather the older form Hermeius, corresponds phonetically to the Sanskrit Sarameyas, and is derived from the root sar, 'to hasten,' whence comes the epithet Sarangu, applied to the Hindu Maruts, gods of the stormwind.

That this explanation of the origin and functions of Hermes explains everything cannot be denied.
Whether it is the right explanation is another matter. Apart from the fact that there are not many things for which an analogy could not be found in the cation of the principle it the period of the principle. found in the action of the wind, it may be doubted, as a matter of general principle, whether we ought to look for one idea from which to deduce all the functions of a god. We may borrow an illustration from comparative syntax: no one would now think of trying to deduce all the meanings of the Greek genitive from one single central idea. In the first place, the Greek genitive conceals beneath it several cases (just as the Greek Heraeles conceals several different local heroes), such as the ablative, the instrumental, &c.; and, in the next place, even the uses of the genitive proper were not as a matter of history all evolved out of one nebulous use equidistant from all subsequent uses. The extenequinistant from all subsequent uses. The extension of the meaning of a case, like the extension of the meaning of a word, is due to analogy, to its application to expressions new but analogous to those in which it was first employed. The same principle of extension by 'contiguity,' as logicians call it, in all probability explains the heterogeneous functions ascribed to any one particular god.

To seek for some notion common to them all may be as mistaken a proceeding as it would be to seek to derive the idea of the grave and the idea of horseracing from some idea equidistant between the two, because 'the turf' bears both meanings.

the two, because 'the turf' bears both meanings. Finally, the beauty which characterises the statue of Hermes in the zenith of Greek art (the so-called Antinons of the Belvedere is a Hermes) naturally belongs to the patron god of the gymnasium and the palæstra, while the celebrated statue of Hermes by Praxiteles portrays the god of the principle of fertility, in whose care all young things were, and to whom therefore it fell to tend his young brother Dionysus. For Hermes Trisnegistus, see Hermetto Books.

Hernes, Georg, a Roman Catholic philosopher and divine, was born at Dreyerwalde, in Westphalia, April 22, 1775. He studied at Münster, became theological professor there in 1807, and in 1819 at Roma. At Bonn he died, May 26, 1931. In his chief works, Die Innere Wahrheit des Christontons (1805), Philosophische Einleitung in die Christontons on a critical theory of knowledge like Kants. The Hernesian method of investigation in like manner discards, in the first stages, and so far as investigation is permitted to extend, all principle of authority; and in the details of metaphysical inquiry, in the selection of the arguments of the existence of God, and of the nature of divine attributes, he departed widely from the old text-books of the schools; although in the general sum of the doctrines of the Roman Catholic Church his orthodaxy does not appear to have been in any degree called into question. Soon many theological and philosophical chairs were filled by Hermesians; and it was not till after the deuth of Hermes that his doctrines were condemned by the pope (1835), and some professors deprived of their chairs. The controversy was continued, as well in Rome as in Germany, for a considerable time; by degrees, however, the Hermesian party fell away. See works on Hermes and his movement by Esser (1832), Elvenich (1836), Niedner (1839), and Stapp (1845).

Hermetic Books, the sacred canon of the ancient Egyptians, consisted of forty-two hooks, divided into six sections. They constitute what is virtually an encyclopedia of Egyptian wisdom, in that they treat of religion, the arts, and science—the nature of the gods, laws, liturgical rites and ecremonics, hymns, hieroglyphics, geometry, astronomy, medicine, and cosmography. The name 'hermetic' comes from Hermes Trismegistus ('Hermes Thriee-greatest'), the Greek name of the Egyptian god Thoth, who was regarded as the originator of Egyptian culture, the god of writing, of religion, and of the arts and sciences. Neither the time at which these books were actually written, nor the author or authors who wrote them, can now he determined. They are evidently based upon the Egyptian mythology, but at a time when it was beginning to feel the influence of Hellenistic culture, since traces of Neoplatonist ideas can be discerned in them, as also indications of the influence of the Jewish philosopher Philo. The Greek and Latin texts of the hermetic books exist, but only fragmentarily, in the writings of such writers as Stoheus, Cyvillus, Suidas, and Lactantius. The greater part of these pieces have been published by Parthey (Hermetis Trismegisti Poemander, 1854), and again by Ménard (Hermès Trismégiste, 1866). The Papprus Ebers (1875) is generally accepted as being one of the medical books of the series. The teachings of Thoth were at first regarded as esoteric

doctrines, and as such jealously guarded by the sages and from them transmitted to their pupils, these depositions of the sacred lore making what was called the hermetic chain. Thoth was also the inventor of magic and alchemy, whence the latter was sometimes called the hermetic art, and whence are derived the terms hermetic medicine, hermetic freemasoury, and hermetically scaled, this last to signify the closing of a box or jar or other receptacle in such a way as to exclude absolutely the atmosphere.

Hermit (thr. eremites), a name given in the early ages, and still more in the later church, to a carry ages, and still more in one facer church, to a solitary ascetic, who, with a view to more complete freedom from the cares, temptations, and business of the world, took up his abode in a natural cavem or a rudely-formed lint in a desert, forest, mountain, or other solitary place. In the first centuries the names of cremite and anchorite (Gr. anacho. $r\bar{c}t\bar{c}s =$ 'one who retires'—i.e. from the world) were indiscriminately applied to these solitaries; but, the word exemita having been adopted into Latin, hermit' is more commonly used in the modern languages which are derived from that tongue. Hermits began to appear in the Christian church in the 3d century. The advocates of Asceticism in the 3d century. The advocates of Asceticism (q.v.) were the first to set the example of retiring (q.v.) were the first to set the example of retining from eities to inral districts and villages. But the hermits went further, and sought to withdraw altogether from mankind, that they might give themselves up to a life of solitary but holy contemplation. The carliest hermit is said to have been Paul of the Thebaid (Egypt), who during the Decian persecution fled for safety to the desert (250); there he lived for the rest of his life, dying, 113 years old, about 342. The fame of his sanetity quickly incited others to imitate his mode of life. The most famous amongst these successors was St Anthony (q.v.). At the time of his death (365) hermit cells existed in considerable numbers in the deserts of Egypt, Syria, and Palestine. But the hermits were not always able to preserve their solitude unbroken. The able to preserve their solitude unbroken. The fame of their sanetity drew many to visit them, partly ont of curiosity, partly to enjoy pious converse with them, or to got religious advice from them, partly also in the belief that diseases, particularly mental diseases, were cured by their blessing. Sometimes they returned for a short time to the midst of their fellow-men to deliver warnings, instruction, or encouragement, and were received as if they had been inspired prophets or angels from heaven. The Stylites (q.v.) or pillar-hermits, who spent their lives on the tops of columns, and similar occentric beings, were a base carieature of the true hermit, men in whom the good spirit of asseticism had become perverted by exaggerated fancy or pride or passion. But the number of hermits gradually diminished as the comobite life of convents grew into fashion. In deed the institution at no time secured the same facting in the Western Church that it did in the Eastern; and perhaps the reason may in part be found in the difference of climate, which renders a manner of life impossible in most parts of Enrope that could be pursued for many years in Egypt or Syria. Partial revivals of the practice continued to be made, however, during some centuries, St Cuthbert (q.v.) being a case in point. The name hermit was in still later ages applied to those cecentric individuals who separated themselves from their fellow-men to live in caves or solitary hats, not from any religious motives, but from a morbid aversion to human society or an inordinate love of solitude. See MONACHISM, and Charles Kingsley's Hermits (1869).

Hermitage. Sec WINE.

Hermit-crab, a name applied to the members of a family of crustaceurs (Pagmide), notable for their habit of sheltering themselves in gasteropod shells, and for the soft-skinned and generally nnsymmetrical tail, probably in part the cause and in part the consequence of this curious custom. The eyes are borne on long stalks; the great claws are very large and generally unequal, one being used to close the entrance of the shell into which used to close the entrance of the shell into which the hermit can wholly retract himself; the ab-dominal appendages are practically aborted, with the exception of those at the tip of the tail, which bold so firmly on to the spire of the inhabited shell that it is difficult to pull out the crab un-broken. There are a great many different kinds of hernit-crabs, and these utilise many forms of gas-teropod shell, not always keeping constant to one type of house. The commonest species (Pagurus or Eupagurus bernhardus) is usually found tenant-ing the shells of the whelk (Buccinum); while



Common Hermit-crab shifting from one whelk shell to another.

another very common species (P. or E. pridcauxii) may be found inside shells of Fusus, Murex, Cancellaria, Turbo, Buccimun, &c., and is also very interesting as an illustration of partnership or Commensalism (q.v.) with a species of sea anemone which forms a cloak round the shell. It masks the hermit-crab, and may also be useful on account of its stinging-cells, while the hermit-crab repays the anemone by carrying it about, and doubtless also with debris of food (for illustration, see ANEMONE). This habit of helpful partnership has been observed even in *Pagurus abyssorum* from a depth of 3000 fathoms. As hermit-crabs grow they have not only to cast their own armature in the usual crustacean fashion, but they must periodically shift to a successively larger and larger house. In looking out for a new shell to tenant hermit-crabs are naturally in a harry, being then in a position of defencelessness unusual for them; and it has been observed that they do not always seek for an empty molline shell, but may evict the rightful owner of one which strikes their fancy. The common hermit-crabs feed on mollness and animal debris. They are most interesting inmates of aquaria, but their voracity is very apt to reduce the population.

Some of the deep-sea herwit crabs, brought up by the Challenger, Blake, and other explorations, are of much interest, especially perhaps inasmuch as several retain the symmetry which the more familiar forms tenanting spiral shells have lost. As such shells are rarities at the bottom of the

deep sea, some of the hermits retain the doubtless original free life. Such is Tylaspis anomala, from the south Pacific at a depth of 2375 fathous, which has a very much shortened abdomen, with distinct segments, however, and well-developed symmetrical appendages. From the West Indies the Blake obtained Pylocheles agassizii, living in straight tubes of compacted sand,

and quite symmetrical. Even more interesting is the symmetrical Xylopagurus rectus, living at depths of 300 to 400 fathous, in open tubes of wood or bamboostem, into which the animal retreats head foremost, and guards the opening with firm plates on the end of the tail.

The members of the genus Conobita, from the shores of the Indian Ocean and other warm seas, live in all sorts of houses, including the shells of marine gasteropods (Murex, Purpura, &c.), of landsnails, of sea urchins, or even units. One species, Xylopagurus rectus in its C. rugosa, is famous for its case (a) and free (b). fondness for cocoa-nuts, and



for its excursions ashore. In another genns, the robber hermit-crab (Birgus latro), from the West Indies, lives in holes in the earth under trees, has an almost lung-like modification of the gillhas an almost lung-like modification of the gill-cavity for breathing air directly, yet visits the sea periodically by night. It feeds on cocoa-nuts, though it does not climb for them, and is itself eaten in Amboyna and elsewhere. Darwin has graphically described how it tears the husk from the cocoa-nuts, and hammers on the round depressions at one end until entrance is effected. Out of a hiscuit-box, the lid of which was fastened down with wire, a robber-crab made its escape, actually punching holes in the tin and turning down the edges.

See Commensalism, Crab, Crustacea; J. R. Henderson, Challenger Report on Anomura; Agassiz, Voyage of the Blake; Marshall, Das Tiefsee und ihr Leben (Leip, 1888); and Darwin, Voyage of the Beagle (Lond. 1845).

Hermodactyl. See Colonicum.

Hermon, Mount (now Jebel-es-Sheikh), 9150 feet high, is the culminating point of the Auti-Libamus range. See Lebanon.

Hermopolis Magna, an ancient town of Egypt, situated on the Nile, on the border of the Thebaid, and near the frontier line of upper and middle Egypt. Thanks to its position, Hermopolis grew to be a place of great importance, ranking next after Thebes. It had a celebrated temple sacred to Thoth, the ibis-headed god of letters, of which the portico alone is all that now remains. On the opposite or right bank of the Nile was Antinoupolis, where the dead of Hermopolis were taken for burial. The modern name of Hermopolis is Ashmun or Eshmaon,

Hermosillo, capital of the Mexican state of Sonora, stands in a fertile plain on the Rio Sonora, 50 miles by rail N. of the port of Guaymas. It has a mint and other government buildings, a bank of issue, sawmills, distilleries, and shoe and furniture factories, and a large export trade in wheat and wine. Pop. 15,000.

Hermonpolis. See Syr.1.

Hermus, a river of Asia Minor, flowing through the plain of Sardis, and falling into the Gulf of

Herne Bay, a watering-place of Kent, 12 miles W. of Margate. Founded in 1830, it has a pier 1213 yards long, an esplanade 1 mile long, and a handsome clock-tower. Bishop Ridley was vicar of Herne in 1538-40. Pop. 2816.

Herne the Hunter, a figure in popular tradition, long supposed to range at midnight around an ancient oak in Windsor Forest. He is referred to in Shakespeare's Merry Wires of Windsor, and Herne's Oak continued to be an object of interest until it was blown down on 31st August 1863. The Queen planted a young oak on the spot where the matriarch had stood as was the spot where the patriarch had stood, as was supposed, for 650 years.

Mernia (Lat.; probably from Gr. crnos, 'a sprout'), in its widest sense, signifies a protrusion, through an abnormal or accidental opening, of any organ from its natural cavity. Although hernia may occur in many parts of the bedy, the word, used by itself, is restricted to signify protrusion of the abdominal viscera, the condition popularly called rapture.

The way in which hernia may arise will be readily understood if we bear in mind that the abdominal viscera are subject to constant pressure from the diaphragm and other surrounding muscles. If at any point the walls of the helly are not suffi-If at any point the walls of the helly are not sufficiently strong to resist this pressure some portion of the viscera is driven through them, and a hernial tumou is formed. Certain parts of the abdaminal walls, especially the inguinal and errual rings, and the unbilitiens, being weaker than others, hernia most frequently occurs at these points. In some instances hernia is congenital, from abnormal deficiency of the walls; in other cases it may arise at any period of life as a result of vicient bodily evention. Say, and sayd convention seem bodily exertion. Sex, age, and occupation seem to have a marked influence in predisposing to to have a market infinence in productioning to thernia. Men are far more liable (in about the proportion of four to one) to this disease than women; though they are less so te those forms of the affection known as fenioral and unhilical hernia. According to Malgaigne, in France one man in thirteen, and one woman in fifty-two, are the subjects of hernia. In respect of age he found that the liability is least about the age of thirteen (one in seventy-seven), after which it progressively increases until the close of life, rising at seventy to seventy-live to one out of every three.

A hernia is almost always compased of a sac and its contents. The sac is a portion of the Peritonean (q.v.) corresponding to the aperture at which the hernin protrudes. It is pushed forward by the protruding viscera, and forms a pouch. The contents triding viscera, and forms a poiden. The contents vary greatly, but generally consist of a portion of the small intestine (particularly of the ileum), forming the variety of hernia known as enterocede. Omentum is often found in hernial sacs, either with or without intestine. Besides the viscera, the sac always contains a certain quantity of fluid secreted by its interior. Hernia is divisible (1) into reducible, or roturnable into the abdomen, irreducible, and strangulated; and (2), according to its situation, into inguinal, femoral, &c.

The treatment of reducible hernia may be palliative or radical. The palliative treatment consists in the applications of the palliative treatment consists. in the application of a trust (see below) to retain the protrusion within the cavity of the abdomen. Each particular kind of hernia (femoral, umbilical, &c.) requires its special form of trass; and before applying it the hernia must be reduced by placing the patient on his back, relaxing the muscles by heading the thigh upon the abdomen, and pressing the tunour back in the proper direction. The truss should then be put on, and should be worn during the whole of the day; and if the patient will submit to wear it (or a lighter one) during the

night, so much the better. The means that have been contrived to effect a radical core are too purely surgical for description in these pages. Below the age of puberty, and if the hernia is recent, a radical cure is sometimes effected by wearing the truss for two or three years.

In irreducible hernia the protruded viscera cannot be returned into the abdomen, but there is no impediment to the passage of their contents or to their circulation. In these cases the patient is often liable to dragging pains in the abdomen, and to attacks of vomiting, in consequence of the movethe abdominal organs being checked by the omentum or intestines being fixed. There is also constant danger of this herma passing into the strangulated form. The treatment may be either palliative or radical. The palliative treatment consists in the employment of a truss with a hollow pad that shall embrace the bernia, and prevent any additional protrusion. An irreducible hernia may sometimes be converted into a reducible one by sometimes be converted into a reducible one by keeping the patient in the recumbent position, and on very lew diet, for two or three months; at the same time keeping the bowels open by laxatives and injections, and maintaining equable pressure over the tomour. Radical cure is, as in the ease of reducible hernia, by operation.

Hernia is said to be strangulated when a portion Herma is said to be strangulated when a portion of intestine or omentum that is protruded is so tightly constricted that it not only cannot be returned into the abdomen, but has its circulation arrested. This form is highly dangerous, because, it relief is not speedily afforded, the strangulated part becomes gangrenous. The causes of strangulation are various, but this condition most commonly arises from a sudden violent effect, by which a firsh provision of intesting is driven into a pre-aviding portion of intestine is driven into a pre-existing hernia, which it distends to such a degree as to produce this complication. The most promions early symptoms are flatalence, colic pains, &c. They are succeeded by vomiting first of the contents of the stomach, then of mucus and bile, and lastly of freeal matters, owing to inverted peristaltic action. If relief is not obtained the inflammation that commences in the sac extends to the pertonenn, and the ordinary signs of pertonitis appear. After a variable time comes gaugrene or mortification of the part, and the patient speedily sinks.

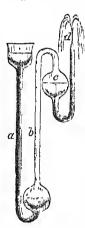
The surgeon first tries to return the intestine, as in the preceding cases. This manipulation, termed the taxis, may be assisted by the internal use of chloraform, inhaled till it produces complete relaxatian of the muscles, by the hat bath, &c. If this fails he must have recourse to the knife to divide

the constriction.

The necessity of having recourse to a suitable truss the moment that the slightest pretrusion shows itself in any of the parts liable to bernia earnot be too strongly niged as a matter of necessary general knowledge. At whatever period of life a hernia occurs, if properly attended to and judiciously supported, it usually gives little trouble, and if it occurs it early life it was aften be caused. and if it occurs in early life, it may eften be cured; whereas, if it be neglected, increase of bulk, and, subsequently, diseased states of the parts, often terminating in death, will almost certainly occur. terminating in death, will almost certainly occur. A truss consists ossentially of a pad or custion attached to a metallic spring, with straps so arranged that its position may be retained during the varied postures of the body. A surgeon should always be consulted in the choice of the instrument. 'The practice,' says Mr Birkett, 'ef leaving cases of rupture in the hands of mere tradesmen cannot be too strongly consured. Amongst the poor we constantly observe the lamentable effects of this proceeding.' Many varieties of trusses have been invented. There are occasional cases in which the common truss fails to support a rupture comfortably, and in these cases various instruments, for the most part the property of special instrument-makers, are often serviceable. The patient must expect to find the truss somewhat uncomfortable for a week or two, but will soon get used to it. The skin of the part upon which it presses should be regularly washed and bathed with eau de Cologne or spirit, as, without this precaution, boils are apt to form on it.

Hero, a priestess of Aphrodite, who loved and was beloved by a beautiful youth named Leander, whose home was at Abydos, on the opposite shore of the Hellespont. Hero's position as a priestess, and the will of her parents, were obstacles to their union, but Leander every night swam across the Hellespont to visit his beloved, directing his course by a lamp that burned on the top of a tower on the seashore. But one tempestuous night the light was extinguished, and Leander was drowned. Hero, when she saw his dead body washed ashore at daybreak, threw herself down from the tower into the sea and perished. A poem on this theme has come down to us under the name of Musaeus; the romantic story is alluded to by Ovid, Vingil, and Statius; and in modern times Marlowe, Schiller, and Leigh Hunt have retold it in verse, whilst Grillparzer has made it the subject of a drama.

Hero Of ALLXANDRIA (Gr. Herön), a great mathematician and natural philosopher, was a pupil of Ctesibius, and flourished about 100 or 150 n.C. He seems to have invented a great number of machines and automata, among which are Hero's fountain; a steam-engine on the same principle as Barker's mill; a domble foreing-pump used for a fre-engine, and various other similar applications of air and steam. Among his works which have



Hero's Fountain.

come down to us the most notable is on Pneumatics; Hultsch edited the remaining fragments of his geometrical works in 1864.—Another Hero, called Hero the Younger, who wrote on mechanics and astronamy, long had the credit of writing some of his namesake's books. According to some anthorities he flourished at Alexandria in the 7th eentury A.D.; according to others, at Constantinople in the 10th.—Hero's Fountain is a pneumatic apparatus, through which a jet of water is supported by condensed air. A simple mode of constructing it by means of glass tubes and a glass-blower's lamp is shown in the annexed figure. The column of water in the tube a compresses the air in b; this presses on the surface

in b; this presses on the surface of the water in c, and causes it to gush out at d.

Herod, the name of a family which rose to power in Judea during the period which immediately preceded the complete destruction of the Jewish nationality. The family was of Idnmean descent; but, though alien in blood, was Jewish in religion, the Idnmeans having been conquered and converted to Judaism by John Hyrcanus, 130 b.c. (1) HEROD THE GREAT was the second son of Antipater, who was appointed procurator of Judiea by Julius Cosar, 47 b.c. At the time of his father's elevation Herod, though only fifteen years of age, was made governor of Galilee, and afterwards of Coele-Syria; and ultimately he and his elder brother were made joint-tetrarchs

of Judea. But he was soon displaced by Antigonus, the representative of the Hasmonean dynasty, and forced to flee to Rome, where he obtained, through the patronage of Antony, a full Judgea, 40 n.c. Several years elapsed, however, before he succeeded in establishing himself in Jensalem. On the fall of Antony he managed to secure a continuance of favour from Angustus, from whom he not only obtained the title of lains of balues but all the securious terminals. king of Judwa, but also a considerable accession of territory, 31 B.C. From this time till his death his reign was undisturbed by foreign war; but it was stained with crucities and atto-cities of a character almost without parallel in history. Every member of the Hasmonean family. and even those of his own blood, fell in succession a sacrifice to his jealous fears; and in the later years of his life the lightest shade of suspicion sufficed as the ground for wholesale butcheries, which are related in detail by Josephus. The slanghter of the innocents at Bethlehem is quite in keeping with his character; as was also his ordering the death of his wife Marianne and his two sons by her. The one eminent quality by which Heroil was distinguished, his love of magniof the public works executed under his direction. Samaria rebuilt and Casarea were monuments of his zeal in building. Herod married no fewer than his zeal in building. Herod married no fewer than ten wives, by whom he had fourteen children. He ten wives, by whom he had fourteen children. He died of a painful disease at the age of seventy, the year of Christ's birth—i.e. in the year 4 before the Christian era, as fixed by Dionysius Exiguus (see Chronology, Vol. III. p. 227)—after a reign of thirty-seven years.—(2) HEROD ANTIPAS, son of Herod the Great by his wife Malthace, a Samaritan, was originally designed by his father as his successor; but by the final arrangements of the will of Herod the Great, Antipas was named tetrarch of Galilee and Perea. He divarced his first wife, the daughter of Arctas, king of Arabia Petrca, in order to marry Herodias, the wife of his half-brother Philip—an incestuous connection, against which John the an incestuous connection, against which John the Baptist remonstrated, and was in consequence put to death. It was during a visit of Herod Antipas to Jerusalem for the purpose of celebrat-Antipus to derisalem for the purpose of celebrating the passover that Jesus was sent before him by Pilate for examination. At a later time he made a journey to Rome in the hope of obtaining the title of king; but he not only failed in this design, but, through the intrigues of Herod Agrippa, was banished to Lugdunum (Lyons), where he died in exile.—(3) HEROD AGRIPPA I., son of Aristolulus and Berenice, and grandson of Herod the Great was calcated at Rome. He lived Herod the Great, was educated at Rome. Herod the Great, was enucated at month this debts there in a very extravagant style until his debts take refuse in Idumea. From compelled him to take refuge in Idumea. From this period almost to the death of Tiberius he suffered a variety of misfortunes, but, having formed a friendship with Caligula, he received from him, on his accession to the throne, the tetrarchies of Abilene, Batanica, Trachonitis, and Auranitis. After the banishment of Herod Antipas he received his tetrarchy also—viz. Galilee and Perea. Clandius added to his dominions Judge. and Samaria, and he was thus the ruler of a more extensive territory than even was Herod the Great. extensive territory than even was reroof the Great. He died at Cæsarea of a painful and incurable malady, 'eaten of woms' (Acts, xii. 23), in the fifty-fifth year of his age, and the 44th of the Christian era.—(4) HEROD AGRIPPA II., son of Agrippa I., was at Rome when his father died, and only seventeen years of age. Claudius therefore resolved to detain him for some time, and in the meanwhile re-transformed the kingdom into a Roman province. In 53 A.D. he left Rome,

and received from the emperor nearly the whole of his paternal possessions, which were subsequently enlarged by Nero. Like his ancestor Herod the Great, Agrippa was fond of building, and spent great sums in adorning Jerusalem and other cities; but he failed to scenre the good-will of the Jews. He did all in his power to dissnade them from rebelling against the Romans. When Jerusalem was taken he went with his sister to live at Rome, where he was made pretor, and where he died in the seventieth year of his age—the last of the Herods. It was before him Panl made his memorable defence.—Herodians is a term used probably for the political party amongst the Jews who were friendly to Herod the Grent and his dynasty.

Herodian, a Greek historian, who lived in Rome. His History, in eight books, extends from the death of Marcus Aurelius (180) to the accession of Gordian III. (238), and purports to record events contemporary with the life of the writer. Although he indulges in tricks of style, yet he is tolerably free from the 'Atticism' of the time, and his work is fairly trustworthy. See editions by Bekker (1855) and Mendelssohn (1883).

Herodotus, 'the father of history,' was born between 490 and 480 B.C., between the first and the second of those two Persian invasions of Greece of which he was hereafter to write the history. He was born at Halicarnassus, one of those Greek colonies on the coast of Asia Minor which were conquered by the Persians, and whose efforts to recover liberty were the cause of the Persian wars. Halicarnassus, originally founded by Dorian settlers, had in course of time become an Ianic city, and consequently Herodotus wrote in the Ionic dialect. When the colonies were freed from the Persian yoke the citizens of Halicarnassus differed as to the form of government to adopt, and Herodotus left his native town. His travels were of remarkable extent: he travelled not only over Asia Minor and the islands of the Egean Sea, but over Greece proper. He spent much time at Athens and at Delphi, and paid visits also to Sparta, Corinth, Thebes, Olympia, and Dodona. He also journeyed to Maccedunia, Thrace, and the coasts of the Black Sea. Above all he penetrated to the interior of the Persian empire, to Susa, Echatana, and Balylon; and he 'did' Egypt. On the journey thither he visited Tyre, and from Egypt he reached Cyrene. In 443 B.C. the colony of Thurii was founded by Athens, and Herodotus joined it, whether in that year or not is nucertain. From Thurii he visited Sicily and Lower Italy. He lived to the beginning of the Pelopomesian war, 432 B.C., and perhaps not later than 425 B.C., but when, where, or how he died we do not know. Coneitorm inscriptions prove that the revolt of the Medes referred to in book i. 30 took place under Darius I., and not Darius II., so that we cannot infer from the passage that Herodotus was alive at the latter date (409 B.C.).

Herodotus, then, spent a large part of his life in travelling. Those travels he undertook for the purposes of his history, and his activity, mental as well as physical, in collecting information and making inquiries, historical, geographical, ethnological, mythological, and archaeological, was extraordinary. His history was designed to record not only the wars but the causes of the wars between Greece and the barbarians: thus, as to the Greek the whole world was either Greek or barbarian, he could have no difficulty in finding a place for all his information. The way in which he actually weaves it together is as follows. Beginning with the conquest of the Greek colonies in Asia Minor by the Lydian king Crossas, he has an oppor-

tmuity for giving a history of the kings of Lydia and a description of the country. The Lydians were conquered by the Persians, whose history and empire have now to be described. Amongst the conquests of Cyrns were Babylon and the Massagetæ; of Cambyses, Egypt, the account of which fills book ii. In book iii. the organisation of the Persian empire by its great statesman-king, Darius, enables Herodotus to emphasise the courtrast between the might and magnitude of Persia on the one hand and the inferiority of Greece on the other. The invasion of the Seyths by Darius in book iv. allows Herodotus to place the remarkably interesting ethnological information he bad gadhered from the emporiums on the coast of the Black Sea. And the statement that Darius intended to invade the north coast of Africa brings in what Herodotus had learned at Cyrene and on the journey to it. In books v. to ix. we have the history of the two Pensian wars, Herodotus has been called 'the father of history,'

but, as we have seen, he has an equal right to be called 'the father of geography.' This combinacalled 'the father of geography.' This combina-tion of history and geography is not a feature which distinguishes him from his predecessors, the 'logo-graphers.' They not only composed chronological lists, containing probably a brief account of the events recorded, but they also composed topo-graphical works, which, however, contained in many cases a history of the places described. Thus history and geography (scarcely discriminated) existed before Herodotus' time, nor did he divide them. But the work of Herodotus is to the bald, brief, disconnected notes of his predecessors what lirief, disconnected notes of his predecessors what the work of Homer was to the poems of his predecessors. It is the beginning of Greek prose, as is Homer's of Greek verse; but whereas we have no fragment of any of the poets who lived before Homer, we have of the prose-writers before Herodotus, and the advance in point of form is remark-In reading Herodotus we feel very strongly that the style is the man, possibly because we know so little of the man; but in any case the character revealed by the style is sympathetic in a high degree, and probably few writers of any age or country have so many devoted personal friends as Herodobus counts amongst his readers. He is so involve to feel the country have so the style the style of the style in the style in the style in the style of the simple, so frank, so talkative, amiable, and respectshiple, so trains, so talkative, annulie, and respectively. He wrote indeed not to be read, but to be heard, like all other classical Greek authors, and he read his history in public at Athens and other places. Thus we may account partly for the fact that we seem to hear him talk rather than to be reading an author. But, beyond the charm of style, Herodous had the knack of taking interest in the right this read in the interest in the right things—i.e. things which have continued to interest people for 2300 years. On the one hand, he could write in a spirit worthy of the glorious fight for liberty fought by the Greeks at Marathon, Thermopyla, and elsewhere. On the other, he delighted in the manners and customs of strange peoples, and in things ancient and mysterious. As to his honesty as a historian there is practically no doubt—the author of the *De Malignitate* and Professor Sayee notwithstanding; he never says what he does not believe. He does not apparently suppress alternative versions, and he distinguishes between what he saw and what he was told. He did not believe all that he was told, though he did believe occasionally things which were not true. He is not a scientific historian: what he tells is He is not a scientific historian: what he tells is frequently not history: it is something better—legend. Very possibly he wholly misconceives the strategy of Mardonius, but he preserves the *èthos* of the Greeks who fought—which is of much more moral importance. His story about Rhampsinius is altogether unhistorical, but it is not only more interesting but more valuable for the history of the people than hieroglyphic inscriptions recording the number of captives taken or killed by some king.

The cditio princeps is by Aldus (1502). The best critical editions are those by Gaisford and Stein (Berlin, 1869). The best Latin commentary is that of Bachr (Leip. 1856); the best German, Stein (Berlin, 1877); the best English, Rawlinson (4 vols. 1858). The last contains a translation. Another English translation is by G. C. Macaulay (2 vols. 1890). The appendices to Professor Sayee's edition of books i.-iii. are valuable.

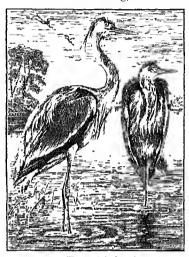
Heroes were, in the Homeric period, the kings, princes, generals, leaders, all brave warriors, and men who excelled in strength, conrage, wisdom, and experience. Many of these had, on account of such qualities, a fabled origin, half human, half divine, and were honoured after their death with a kind of adoration or inferior worship. These heroes and demigods were recognised as the special patrons or protectors of particular countries, cities, or families, as the Pelopides, Atrides, &c., and temples and alters were raised to them. Poetry exalted the heroic sentiment to sublimity; and poems which celebrate the deeds of heroes are themselves termed heroic. The imaginary time when heroes and other semi-divine beings lived on earth was called the Heroic Age.

Heroic Yerse. Sec METRIL

Herold, Louis Joseph Ferdinand, French musical composer, was born at Paris on 28th January 1791, and studied at the conservatoire of music in that city. His earliest successes were achieved with Mille. de la Vallière (1812), a cantata, which gained him a travelling scholarship; the opera, La Gioventi di Enrico Quinto (1815); and the comic opera, Les Rossères (1816). None of his succeeding pieces met with success, until the opera Marie appeared in 1826. Zampa (1831) and Le Pre aux Cleres (1832), which followed next, were both decidedly successful; the former is still put on the stage from time to time. Hérold died on 19th January 1833 at Thernes near Paris. See Jouvin's Hérold, sa Vie et ses Œurres (1868).

Heron, a genns (Aidea) and family (Ardeidæ) of birds of the order Herodiones. The Herodiones (which includes also the families of storks, spoonbills, and fiamingoes) are large birds covered with long loose down, with large wiogs, and a hard horny bill longer than the head, compressed from side to side, and united to the skull by firm broad bones. The Aideidæ are distinguished from the other families by their large hind-toe, which rests on the ground and has a large claw equal in size to the claw of the middle toe having a pectinated or comb-like structure. The family comprises five genera—the Heroos (Ardea), the Night Herons (Nycticorax), the Bitteros (Botaurus), the Boatbills (Cancroma), and the Tigerbitterns (Tigrisoma). In the Heron genus—which includes the species commonly known as Egrets—the plumage is heantiful, but seldom exhibits very gay colours, white, brown, black, and slate, finely blended, generally predominating. The body is small in proportion to the length of the neek and the limbs. The neck is usually curved. See the article FLYING (with illustration) for the position of the neek, wings, &c. in flight—when the long legs are carried straight out, projecting like a tail. Herons are very voracions, feeding mostly on fish and other aquatic animals; but they also often prey on snakes, frogs, rats, and mice, and the young of other birds. They are usually shy, solitary birds, going about singly, lut at nesting-time congregating in numbers, possibly more from community of purpose than from the true gregarious instinct. The Common Heron (Ardea cinerea) measures about three feet from the point of the

bill to the tip of the tail. It is of a delicate gray colour on the upper parts, the quill-feathers are black, the tail of a deep slate colour, and the long plume is glossy dark. It generally builds its nest on a high tree; and as many as eighty nests have heen counted on a single oak. Though io the days of falconry, when it was the chief game pursued, it was highly prized for the table, the common heron is now the object of almost universal hostility. Its geographical distribution is wide, extending from Britain to the countries of northern and southern Europe, being most plentiful in Holland, extending into northern Africa, Caucasus, India, Japan, and Java.—The Purple Heron (A. purpurca) is a somewhat rare British species.—The Great White Heron or Great Egret (A. alba), an extremely heantiful bird with perfectly white plumage, much of it loose and flowing, is an accidental



Common Heron (Ardea cinerea).

visitor to Britain. It is more common in Turkey and Greece and in some parts of Asia, where its upper tail coverts are much worn as plumes.—The Little Egret (A. garzetta), a smaller copy of the great egret, and frequenting the same localities, is about two feet long, and rather quicker in flight than the larger species.—The Buff-backed Heron (A. aquinoctualis) of southern Europe is an insect feeder, and by no means so shy as other species.—America has many species of heroos, most numerous in its warmer parts. A common species of the temperate parts is the Green Heron (A. virescens), whose flesh is much esteemed. Other important species are the Great Blue Heron (A. herodius), the Great White or Florida Heron (A. occidentalis), the Great White Egret (A. candidissima).—The Peacock Heron (A. helias) of South America, a small heron of exquisitely graceful shape and mien, with plumage variegated with coloured spots and bars like the wings of certain kinds of moths, is a favourite pet-bird of the Brazilians.

Herophilus, one of the greatest physicians of antiquity, and co-founder of the celebrated medical school of Alexandria, was born at Chalcedon, in Bithynia, and flourished in the 4th and 3d centuries n.c. He distinguished himself in particular by his devotion to anatomy, especially of the brain and those parts which were less known. He was a skilful dissector, and is said to have even dissected criminals alive; moreover, he was a bold and dexterous surgeon. The few fragments of his writings which remaio were published at Göttingen in 1840.

Herostratus. See Ephesus.

Herpes (Gr., from herpo, 'I creep'), the name of a group of diseases of the skin, characterised by the presence of clusters of vesicles on an inflamed base. There are two well-defined classes

included under the name.

(1) Catarrhal herpes occurs most commonly at the edge of the lip, and often attends some febrile disease, especially acute inflammation of the lungs; but may also follow some local irritation, or he without assignable cause. It is attended sometimes by burning or itching sensations, but rarely by pain. The vesicles dry up into a seab, which falls off in the course of a few days. No treatment is generally necessary; but it is very aut to reenr. It appears less commonly on other parts of the face, on the mucous membrane of the month, and on the

genital organs.

(2) Herpes voster (Gr.; Lat. zona; Eng. shingles, plural of Old Eng. sengle, 'a girth,' through Fr. from Lat. cingulum, words all meaning 'a girdle') is most commonly met with along the course of one of the intercostal nerves, whence the name. It is now known that the inflammation of the skin depends upon an inflammation of the nerve supplying the area affected, though many forms of inflammation of the nerves occur without producing herpes. Its occurrence can sometimes be traced to a blow, to diseased tissues in the neighbourhood, or to the prolonged administration of arsenie; but more often no cause can be assigned for it. appearance of the characteristic eruption is generally preceded for some days by neuralgic pain in ally preceded for some days by neuralgic pain in the affected part; inflammation of the skin in patches, development of vesicles, formation of scals and their subsequent detachment generally run a pretty uniform course, occupying about a fortnight. In young people nothing is left but slight scarring of the skin; but in those beyond middle life an extremely intractable form of neuralgia often remains, and may persist for months. The disease may occur at any age, but a second attack is quite exceptional. More than one intercostal nerve may be affected at once; but very costal nerve may be affected at once; but very seldom two on the opposite sides, so that the popular superstition 'that shingles which meet round the bady always prove fatal' is not likely to be often practically refuted. Though commonest in connection with the intercostal nerves, herpes zoster may occur on almost any region of the body. The brow is a frequent situation; and if the eye is affected, as sometimes happens, it may be seriously damaged. No treatment seems to be effective in arresting the course of the disease; but painting with flexile collodion, or application of zine ointment over the inllamed patches, diminishes their irritability.

Herpetology (Gr. harpeton, 'a reptile,' and logos, 'a discourse'), that branch of natural history which treats of reptiles. See Reptiles.

Herrera, FERNANDO DE, a Spanish lyric poet, of whom we only know that he was born at Seville in 1534, took orders, and died in 1597. As a poet he ranked so high in the opinion of his contemhe raiked so high in the opinion of his contemporaries that they hestowed upon him the appellation of the divine. Many of his lave-poems are remarkable for tender feeling, while his odes, such as that on the 'Battle of Lepanto,' frequently display a lofty enthusiasm; but his language is very artificial, heing full of words, inflections, and inversions in initation of Greek, Latin, and Mony of his negure wars agained. Italian authors. Many of his poems were accidentally burned shortly after his death; most of what survived were published by Pacheco, the painter, in 1619, and all were printed in the Coleccion of Ramon Fernandez (1786; new ed. 1808). Herrera wrote in prose a good Account of the War in Cyprus

(1572), and translated from the Latin of Stapleton a life of Sir T. More (1592).

Herrera, Francesco, surnamed El Viejo (the Elder), Spanish painter, was born in Seville in 1576. His drawing was correct, and his pictorial style is marked by energy, freedom, and boldness, and he hecame the founder of a school. Herrera's masterpiece was the 'Last Judgment,' in a church at Seville. Besides historical pieces, he also painted such subjects as wine-houses, fairs, carnivals, and the like; he was a clever worker also in bronze. In 1650 he removed to Madrid, and died there in 1656. Some of his best works are in the Louvre at Paris,
—His youngest son, Francesco Herrera, surnamed Et Mozo (the Younger), was born at Seville
in 1622. He studied under his father, but to escape his roughness and cruelty ran away to Rome, where he became celebrated for pictures of still life, especially for fish-pieces. Returning to Spain after his father's death, he at first settled in Seville, and was in 1660 appointed sub-director of the academy there; but he soon betook himself to Madrid, where he became painter to the king. His best works are a fresco, 'The Ascension,' in the Atocha church in Madrid, and 'San Francisco,' in Seville cathedral. Herrein died at Madrid in 1685.

Herrera y Tordesillas, ANTONIO, Spanish historiau, was horn at Cuellar, in Segovia, in 1549, was appointed by Philip II, historiographer of the was appointed by Chill 11. instoriographer of the Indies and of Castile, and died at Madrid, 29th March 1625. His principal work is a General History of Castilian Exploits in the Pacific (1601–15), that is, a history of the Spanish-American colonies from 1492 to 1554 (Eng. trans. by John Stevens, 1725). His Description de las Indias Occidentales (1601–161), forme on introduction to the observed (1601 and 1615) forms an introduction to the above work. He also wrote on the history of England and Scotland in the time of Mary Stuart; histories of Portngal, of the world in the time of Philip II., of the Leagne, and of the Spanish, French, and Venetians in Italy.

Herrick, ROBERT, a great English poet, was born in London, the fourth son and seventh child of a prosperous Cheapside goldsmith of good Leicestershire descent, and was baptised 24th August 1591. His father died the year after, not without suspicion of suicide, and the boy was bound apprentice for ten years to his mucle, afterwards Sir William Herrick, also a well-to-do Cheapside goldsmith. By September 1613, however, we find him a fellow-commoner at St John's College, Cam-bridge, whence he sent fourteen letters, still exmage, where he sent fourteen letters, sun extant, to his guardian-nucle, who appears to have been stingy in his allowances of money. The last letter is dated from Trinity Hall, whither he writes he had migrated for economy. Herrick took his M.A. in 1620, and apparently came next to London, where, no doubt, he plunged light-heartedly into the gaieties of the town, as well as those bying feasts made at the Sun, the Dog, the 'those lyric feasts made at the Sun, the Dog, the Triple Tun.' He was already a poet, and his 'wild, unbaptised rhymes' quickly earned him the friendship of Ben Jonson and his ring of hilarious spirits. In 1629 his mother died, and in the same year he took orders, and was presented to the sequestered living of Dean Prior, near Totnes, in Devonshire. He bemoans his lonely banishment in 'loathèd country life' among 'currish' natives in 'dull Devonshire,' but from his poems we cannot doubt that his keen eye and kindly heart found him a consolation in the observation of the honest countryfolk around him whose old-world customs are mirfored so charmingly in his verse. Of his clerical life we know but little, although Wood speaks of his 'florid and witty discourses,' and tells us he was 'beloved by the neighbouring gentry.' He has immortalised his housekeeper, 'Prine' or Prudence

Baldwin, as well as his spaniel 'Tracy,' and a tradition long survived of a 'favourite pig, which he annused himself by teaching to drink out of a tankard.' His 'Julia' is more visionary than these, but no doubt had her existence also. In 1647 the Paritan supremacy ejected him from his vicarage and drove him to London, whence he returned to reassume his duties in August 1662. Here twelve years later he died, being buried 15th October 1674. A monument was placed in the church in 1857.

Herrick's one volume of verse contained the Hesperides, dated 1648, and Noble Numbers, dated 1647. The last is a collection of professedly religions poetry; the former, an ill-arranged group of lyrical poems addressed to friends and eminent contemporaries, amatory poems, epithalamia, epigrams, fairy poems, and short occasional odes and poems on all kinds of subjects, of which sixty-two had already seen the light in Wit's Recrutions (1640). The whole embrace more than 1200 poems of lengths varying from five or six pages to a single couplet, many of which are among the most exquisite examples of lyrical art in English. Of these it is enough to name 'Corinna's going a Maying,' 'The Mad Maid's Song,' 'The Night Piece to Julia' ('Her eyes the glow-worm lend thee'), 'To the Virgins' ('Gather ye rose-bads while ye may'), 'To Daffodis,' 'Cherry Ripe,' 'To Anthea' ('Bid me to live'); and, among religions poems, such masterpieces as 'The Litany,' 'The Dirge of Jephthali's Daughter,' and 'A 'Thanksgiving to God' ('Lord, thou hast given me a cell'). Much of his religious poetry is weak, but these are immortal. Yet the reader turns most often to his secular poems, in almost every line of which he will find a charm of a quite peculiar nature, save only in the epigrams, which are often poor and sometimes gross. The last laureate of fairy-land, his 'Fairie Temple,' 'Oberon's Feast,' and 'Oberon's Palace' were not unworthy to follow Shakespeare's Midsummer Night's Dream and Drayton's Nymphidia.

The Hesperides is one of the sunniest books in English literature, consummate in finish, exquisite in fancy, fresh and natural throughout, and rich in sweet and delightful pictures of the homely English country and the quantit, kindly, old-world enstons of her folk. His love-poems are stamped with a real abandon that is not Horatian and not Anacreoutic, but all his own, and ever throughout his joyonsness the ear detects an undertone of melancholy. In unforced sweetness of melody and perfect harmony of sound and sense Herrick rises above all his brethren among the Caroline lyrists, and, indeed, follows closely in the steps of Shakespeare. Like the master he is thoroughly natural, unaffected, and English. We do not look for depth and intensity of passion in his work, but within his limits he attains perfection. The fresh fragrance of English meadows lives in his verse, and will beget perpetual delight as long as English literature is read. He sleeps seeme of the eternity of fame for which he longed, and which he half-promised to him-

After being neglected for more than a hundred years Rerrick's poems were revived by Mr Nichols (Sylvanus Urban) in the Gentleman's Mayazine of 1796 and 1797. Editions followed by Dr Nott (1810), T. Maitland (Lord Dundrennan, 1823), W. C. Hazlitt (1869), and Dr Grosart (3 vols. 1876, with an exhaustive memorial-introduction). See F. T. Palgrave's Chrysomela (1877), a selection by a fine critic, with a suggestive introduction; and Edmund W. Gosse's essay in Scruterith-Century Studies (1883).

Herring (Chapea harengus) belongs to the order of bony fishes (Teleostei) called Physostomi, and characterised by the existence of an open communication between the air-bladder and the

The family Chipeida is distinguished by the following characters: There is a single short dorsal lin near the middle of the dorsal edge of the body, also a single anal fin. The pelvic fins are abdominal in position, as in all Physostomi. Body covered with thin cycloid scales, head naked, barlels absent. Maxillary hones composed of at least three movable pieces. Branchial apertures very wide. The stomach has a posterior prolongation, which communicates with the air-bladder Lateral line usually absent. The genus Clupea, which includes the herring, sprat, pilchard, and shad, is thus defined: Body compressed, with the scales of the ventral edge keeled, each keel projecting posteriorly into a point, so that the edge is serrated. Upper jaw not projecting beyond the lower. Cleft of the mouth of moderate width. Teeth, when present, rudimentary and deciduous. Candal forked. *C. harengus* is distinguished by having an ovate patch of minute teeth on the vomer; the servations of the ventral edge are weak; the pelvie fins arise behind the front end of the base of the dorsal. These characters distinguish the herring from the sprat. From the pilchard it is easily distinguished, as that species has much larger scales, and has radiating ridges on the operculum which are absent in the herring. The shad, of which there are two kinds, are much The shad, of which there are two kinds, are much larger, and have opercular ridges like the pilchard. The air-bladder in the herring has an opening to the exterior behind the anns. The herring is a pelagic and gregarions fish, living on the small pelagic organisms, especially Crustacea, which swarm in the sea. The species occurs throughout the German Ocean and the North Atlantic, both on the American and European sides, and also the seas to the north of Asia. Enormous shoals of herring approach the coast every summer in order to spawn, and it is then that the great fisheries are carried on. There are in most places two spawning periods, but the number of those which spawn ing periods, but the number of those which spawn in winter or spring is always much smaller. The snumer spawning season varies in different latitudes. On the east coast of Britain it occurs in June and July at Wick, July and August at Peterhead and Aberdeen, August and September at Yarmonth, September and October off Kent, while on the south coast of England only one spawning period has been observed, namely in January. This corresponds to the winter spawning in the north, which at the month of the Firth of Forth takes place in January and February. takes place in January and February.

The eggs of the herring are small and numerous, and are heavy and adhesive, so that when shed they adhere to the stones, shells, and hydroids, or other material of the sea-bottom. The spawning-ground chosen is always hard, rough, and often rocky, so that it is usually ground which trawls cannot be worked over. The same spawning-grounds are annually visited by the winter-spawning herring. Two such grounds are accurately known—one to the west of the isle of May at the month of the Firth of Forth, and one off Ballantrae on the west const of Scotland, in Ayrshire. None of the summer spawning-beds have been actually discovered, though it is certain that there are acres of them along the east coast of Britain. It is probable that herring remain in Loch Fyne all the year round, and young and halfgrown herring are often found in estuaries at various times of the year, ascending as far as the tides extend.

The artificial fertilisation of the herring's ova and their hatching in aquaria are easily effected, and have been carried out several times by various experimenters. But the artificial propagation has never been carried out on a large scale for the sake of artificially maintaining or increasing the supply of herrings, because it has never yet been proved that the supply has anywhere continuously diminished in consequence of the enormous captures which are annually made. The abundance of the fish at a particular place varies capriciously from year to year, and at different periods of time. On the coast of Bohnslän, in the south of Sweden, multitudes of herring have appeared within the last few years after they had deserted that coast

for about seventy years.

Herring-eggs were first hatched under observation by Prof. Allman, in Scotland, in 1862; the eggs in this case were dredged from the bottom off the isle of May. In 1874-78 the eggs were both fertilised and hatched artificially by the German Fishery Commission at Kiel. The development has been described by Kupffer, in 1878, in the annual report of the Kiel Commission. Artificial hatching has also been earried out by the United States Fish Commission. The eggs, when pressed from the fish, are received on glass plates, to which they adhere, and are then developed in a current of pure sea-water. The larva, when hatched, is very slender and elongated: it is perfectly transparent, and at once commences to lead a pelagic existence in the surface waters of the sea. Herringspawn at the bottom of the sea is largely dovoured by flat-fish and haddocks, which are extremely fond of it.

Meyer, of the Kiel Commission, noted the growth of the herring in captivity: when first hatched it is 5th to 5d of an inch long; one month after hatching it is 5ds of an inch; at two months it is 15 inch; at three months about 2 inches. Then it graws at the rute of about half an inch per month, so that at six months it is about 3½ inches, and at one year 6½ inches. Thus the herring is mature at two years old, but not full-sized. The so-called 'mattes,' which are mature fish, and shed spawn and milt, are probably the two-year-old fish spawning for the first time, while the full-grown herring are three or four years old.

For detailed information on the natural history of the herring, see Nature (vol. xxvi. p. 607, and vol. xxix. p. 539) and the 'Jahresberichte' of the Commission zur Untersuchung der Deutschen Aleere, which contain numerons claberate memoirs on the subject. See FISHENIES.

Herrings, BATTLE OF. See FASTOLF.

Herrnhut, a small town in the kingdom of Saxony, 18 miles SE. of Bantzen, celebrated as a chief seat of the Moravian Brethren (q.v.) ar Herrnhuters, who settled here in 1722. Pop. 1125.

Herschel, Sir William, born at Hanover, November 15, 1738, was the son of a band-master, and was educated as a professional musician. Ho first visited England as a member of the band of the Hanoverian Guards; but in 1757 he established himself in England, becoming a teacher of music in the town of Leeds, whence he went to Halifax as organist, and subsequently (1766) in the same capacity to Bath. Here he would seem to have first turned his attention to astronomy. Wanting a superior telescope, and unable to afford to buy a good reflector, he made one for himself—a Newtonian, of 5 feet focal length, and with this applied himself to study the heavens. In 1781 he made his first discovery, being a new planet, which at first he took for a comet. It was detected by an exhaustive process of surveying the heavens, which Herschel was the first to follow, taking the stars in regular series, and examining them all in their groups through the same instrument. The result of his discovery was his appointment to be private astronomer to George III., with a salary of £200 (afterwards £250) a year. He then went to live at Slough, near Windsor,

where, assisted by his sister Caroline, he continued his researches. Herschel married a Mrs Mary Pitt, and left one son, John. He was knighted by George HL, and made a D.C.L. by the university of Oxford; he became rich partly through his wife's jointure, and partly through selling unirrors for reflecting telescopes. He died at Slongle, 25th August 1822.

Herschel contributed sixty-nine papers to the Philos. Trans. between the years 1780 and 1815; and to the first vol. of Mem. of the Astron. Society he contributed a paper 'On the Places of 145 New Doable Stars.' He greatly added to our knowledge of the solar system: he discovered Uranus (called by him Georgium Sidus) and what he took for its six satellites, and two satellites of Saturn. Besides this he detected the rotation of Saturn's ring, the period of rotation of Saturn itself and that of Venus, the existence of the motions of binary stars, the existence of the motions of binary stars, the extended our knowledge of the Milky Way and the constitution of nebular, and, in fact, was the first to give the human mind any conception of the immensity of the universe. His catalogue of double stars, nebular, &e., and tables of the comparative brightness of stars, and his researches in regard to light and heat would of themselves entitle him to the first rank as an astronomer and natural philosopher. He erected a famous monster tolescope of 40 feet length. It was begun 1785, and finished 1789, in which year he by means of it detected the sixth satellite of Saturn. See Herschel's Life and Works, by E. S. Holden (New York, 1881).

His sister, CAROLINE LUCRETIA, was born 16th March 1750, and lived in Hanover till 1772, when she came to England to live with her brother at Bath. When William turned astronomer she at Bath. When William turned astronomer she became his constant helper; and on his being appointed private astronomer to George III, she acted as his assistant, doing all the drities of an assistant-astronomer, and in that character receiving a small salary from the king. While discharging her duties in this position she found time for a series of independent observations with a small Newtonian telescope, made for her hy her Her special business was to sweep the brother, heavens for comets, eight of which she discovered, in regard to live of which she has the credit of priority of discovery; and several remarkable nebulic and clusters of stars included in William's catalogues were described from her original observations. In 1798 she multished, at the expense of the Royal Society, A Catalogue of Stars taken from Mr Flamsteed's Observations, which contained 561 stars omitted in the British catalogue. She lived with her brother during the whole of his career, sharing his labours and distinctions, and on his death returned to her native country. She was then seventy two years of age, but she lived to be ninety eight, retaining all her faculties to the last. In 1828 the Astronomical Society conferred on her their gold medal, and she was an honorary member of the society. She died 9th January 1848. See her Memoir and Correspondence, edited by Mrs Hersehel (1876).

SIR JOHN FIRMERICK WILLIAM HERSCHEL, the only son of Sir William, was horn at Slough, 7th March 1792, and educated at Eton and St John's, Cambridge, where, in 1813, he was sentor wrangler and first Smith's prizeman. His first publication was A Collection of Examples of the Application of the Calculus of Finite Differences (1820). In 1822 he applied himself especially to astronomy, using his father's methods and instruments in observing the heavens. For a time he worked with Sir James South in re-examining the nebular and einsters of stars described in his father's catalogues. The results of the re-examination were given in

1833 to the Royal Society in the form of a catalogue of stars in order of their right ascension. The of stars in order of their right ascension. catalogue contained observations on 525 nebula and clusters of stars not noticed by his father, and on a great number of double stars—in all between 3000 and 4000. This important contribution to science led to his being acknowledged as the worthy successor of his father. successor of his father; so early, indeed, as 1826 the Royal Society had voted to him and South a gold medal apiece for their observations on double sturs; but by 1833 his pre-eminence was beyond the necessity of being marked by acknowledgments. His treatises on Sound and on the Theory of Light had appeared in the Encyclopædia Mctropolitana (1830-31); his treatise on Astronomy (1831) and the 'Preliminary Discourse on the Study of Natural Philosophy' in Lardner's Cyclopædia; not to mention his papers in the Transactions of the Astronomical Society. In January 1834 Herschel arrived at the Cape of Good Hope, with the intention of completing the survey of the sidereal heavens, by examining the southern hemisphere as he had done the northern. Here he established his observatory at Feldhausen, six miles from Table Bay; and in four years, working all the time at his own expense, he completed his observations. The public interest taken in his labours was, as might be supposed, very great; but though now and then gratified by partial statements of his results, it was not till 1847, nine years after his return from the Cape, that it received full gratification in the publication of a volume of Astronomical Observations made at the Cape; being the Completion of a Telescopic Survey of the whole Surface of the Visible Heavens commenced in 1825. It need not be said that the results of these labours are invaluable. They are now incorporated into all books on astronomy. Herschel, when at the Cape, gave an impulse to the science of meteorology, having the merit of having suggested the scheme for taking meteorological observations simultaneously at different places.

On his return to England honours were showered on him—he was made D.C.L. of Oxford, and, on the Queen's coronation, a baronet. He was president of the Astronomical Society; and in 1849 hecame Master of the Mint. His articles on Meteorology, Physical Geography, and Telescope, contributed to the Encyclopedia Brittanica, were published separately; and his Popular Lectures on Scientific Subjects (new ed. 1880) and Collected Addresses are well-known works. Herschel was also a distinguished chemist, and attained important results in photography independent of Fox Talbot. His researches on the undulatory theory of light were very valuable. He had also a profound interestin poetry, and made translations from Schiller and from the Iliad. He died at Collingwood, in Kent, on 12th (not 11th) May 1871, and was buried in Westminster Abbey near Sir Isaac

Newton.

Herschel, or Uranus. See Planet.

Herse. See Hearse.

Hersfeld, an old town of Hesse-Nassau, on the river Fulda, which here becomes navigable, 27 miles N. of Fulda by rail. Here are a fine Gothic church, built in 1320; the ruins of the cathedral, destroyed by the French in 1761; and the formerly-celebrated Benedictine abbey, founded in 769. Pop. 7271.

Hership, an old Scotch law term, denoting the offence of carrying off cattle by force.

Hertford, the county town of Hertfordshire, 26 miles N. of London by rail, is situated on the Lea, which is navigable for barges up to this point. It contains few buildings of any architectural importance, save two ancient churches; there are

also a town or shire hall (1768), an infirmary, and a corn exchange and free library (1859). Hertford has a grammar-school and several chanity schools, whilst at the entrance into the town on the London Road is a preparatory school in connection with Christ's Hospital (q.v.) in London. A considerable trade is carried on in corn, malt, and flour. Hertford returned two members to parliament till 1867, and in 1885 ceased to be a parliamentary borough. Pop. (1851) 6605; (1881) 7747. The head spring of the New River (q.v.) rises about a mile east of the town, and 2 miles westward is Panshanger, the seat of Earl Cowper, with its valuable collection of pictures. Of the old castle of Hertford, commenced by Edward the Elder about 905 to protect the inhabitants from the incursions of the Danes, and strengthened by William the Conqueror, but a small portion now remains; the present castle was built by William Cecil, Earl of Salisbury, or Sir William Harrington, in the reign of James I., and in 1805-9 was occupied by the East India Company as a temporary college during the erection of Haileybury (q.v.). See Turner's History of Hertford (1830).

Hertfordshire, or Herts, an inland county of England, extending 35 miles in a north-easterly direction and 20 miles in mean breadth, is bounded N. by Cambridge, E. by Essex, S. by Middlesex, and W. by Buckingham. It contains 611 sq. m., of which more than one-half is under tillage, one-fourth pasture, and one-seventeenth in wood; is divided into 8 hundreds. 2 numerical horozofe. is divided into 8 hundreds, 2 municipal boroughs—viz. Hertford and St Albans—138 parishes, and has 11 market towns, the chief of which are Hertford (the county town), St Albans, Watford, Hitchin, Houel Hempstead, and Bishops Stortford. Pop. (1801) 97,577; (1841) 156,660; (1881) 203,069. The surface is for the most part level of the most part l (1881) 203,069. The surface is for the most part level, except in the north, where a branch of the Chiltern Hills skirts the county, Kensworth Hill (904 feet) being the highest elevation. The principal rivers are the Lea, the Stort, and the Colne, all affluents of the Thunes, and the artificial stream called the New River (q.v.): the Grand Junction Canal, too, passes through the south-western extremity of the county. Chalk, at a gleater or less depth below the surface, forms the basis of the soil, which is various, but principally loam and clay, the former being met with in nearly all its gradutions, more or less intermingled with flint or sand. The climate is mild and healthy. As a manufacturing county Herts does not stand As a manmaturing county herts does not stand high. Straw-plaiting is, however, largely carried on in the north and west portions, where the land is least adapted for agriculture; in the neighbour-hood of Watford and Rickmansworth are several paper and silk factories, and at Great Berk-hampstead are extensive chemical works. The agriculture of the county has improved very much of late years, the quartity of havley and wheel of late years, the quantity of barley and wheat grown being very considerable; immense quantities of hay, too, are sold off the land, and sent to London. Ware is the chief seat of the malting trade in the kingdom; Cheshunt, Waltham Cross, and Bishops Stortford are famous for their rosegardens, and in some districts watercress is ex-tensively cultivated for the London market. Herts is almost entirely in the diocese of St Albans and in the South-eastern Circuit, and since 1885 has returned one member to parliament for each of its four divisions—North or Hitchin, East or Hertford, Mid or St Albans, and West or Watford. Many historical events are connected with the county: it was the scene, at Vernlam near the present town of St Albans (q.v.), of contests with the Romans, and of the martyrdom of St Alban; is it to work for the contests of the contest of the cont in it, too, were fought three of the most important battles in England's history-the first in 1455,

when Henry VI. was wounded and taken prisoner at St Albans by the Yorkists; again at St Albans six years later, when victory decided for the opposite party; and lastly in 1471, at Barnet, when the decisive battle was fought, in which the Laucastrians were utterly routed by the Yorkists. Rye House was the residence of Rumbold, one of the persons engaged in the alleged plot against the life of Charles II. Kings Langley, Hunsdon House, and Hatfield were royal residences, and at Theobalds James I. ended his days. Amongst the worthies of Herts mention may be made of Nicholas Brakespeare, afterwards Pope Adrian IV.; Francis Bacon, afterwards created Lord Vernlam; Richard Gough, the antiquary; the poet Cowper; Bulwer Lytton; Charles Lamb; and John Leech. Hertford gave a title to a branch of the family of Scymonr (q.v.; and see Edward VI.). See Cussan's History of Herts (1880).

Hertha, the name by which a North German deity has been usually known, who was identified by Tacitus with 'Mother Earth,' and whose most sacred place was supposed to be the Hertha Lake in Riigen. But it now appears that the time reading of the passage in Tacitus is not Hertha, but Northus.

Hertogenbosch, or Herzogenbusch. See Bois-le-Duc.

Hertz, Henrik, Danish poet, was born of Jewish parents in Copenhagen, 25th August 1798. He was intended for the bar, but the literary instinct in him was too strong. His talent lay most in the direction of drama and lyric poetry, though he also wrote other kinds of pure literature. He died at Copenhagen, 25th February 1870. The first of his productions to make any sensation was tipengangerbrevene (*Letters of a Ghost'), a rhymed satirical poem, written in imitation of Baggesen, in 1830. His finest dramatic writings are Svend Dyring's Huus (1837), a romantic drama founded on an old folk-song; and Kong Rene's Datter (1845), a lyric drama (translated four times into English—in 1850 by Sir Theodore Martin). Other works that may be named are the lyric concedy Amors Geniestreger (1830) and a humorous navel, Stemninger og Tilstande (1839). His lyrics (4 vols. 1857–62) are characterised by grace, colour, passion, and elegance of versilication. His dramatic works were published in 18 vols. in 1854–73.

Hervé, whose proper name is l'Lorimonn Ronger, French musical composer, was horn on 30th June 1825, at Hondain, near Arras. At first he earned his living as organist at several churches in Paris. But in 1848 he took to the operatie stage, making his first appearance in an operatic composed by himself, Don Quichotte et Sancho Pança. Then, after officiating for three years as director of the orchestra at the theatre of the Palais Royal, he worked as singer, composer, director, and actor in various theatres. Some of his light operas have had very successful runs, such as L'Œil Crevé, Chilpérie, and Le Petit l'Eaust.

Hervey, James, anthor of Meditations among the Tombs, was born at Hardingstone, near Northampton, on 26th February 1714. The facts of his life are few. He was educated at Northampton and Lincoln College, Oxford, and was first curate and afterwards incumbent of Weston-Favel and Callingtree, both near Northampton. He died on Christmas-day 1758. Hervey adopted a Calvinistic ereed, and in the 18th century his works, though not distinguished by any extraordinary qualities, enjoyed great favour with the people. The best of them are Meditations and Contemplations (1746), including his most famous production, 'Meditations among the Tombs,' and also 'Reflections on a Flower Garden' and 'A Descant on Creation;'

Contemplations on the Night and Starry Heavens (1747); and Theron and Aspasio, or a Series of Dialogues and Letters on the Most Important Subjects (3 vols. 1755). This last gave rise to the Sandemanian controversy as to the nature of saving faith. A complete edition of his works, with a memoir, appeared in 1797. See also his Life and Letters (2 vols. 1760).

Hervey Islands. See Cook Islands.

Herwarth von Bittenfeld, KARL EBER-HARD, Prinssian general, was born in 1796, and gained his first lanrels in the war of liberation, especially in the battle of Leipzig. In 1864, raised to the rank of general, he acquired great fame through his daring capture of the isle of Alsen. In the campaign of 1866 he was entrusted with the occupation of Saxony, and then with the command of the army which advanced from Saxony into Boliemia. He contributed largely to the brilliant victories of Hülmerwasser, Münchengrätz, and Koniggratz. In 1870, on the enthreak of the Franco-German war, he was made governor of the Rhine provinces, in 1871 a general field-marshal; and he died at Bonn, 2d September 1884. In the war of 1866 one of his sons fell; in that of 1870 two were killed.

Herz, Henri, a pianist and composer for the pianoforte, was born of Jewish parentage at Vienna in 1806, and educated principally in Paris, where his talent was early recognised. His compositions became popular over Europe, and he was received with great applause on visiting England in 1834, and America in 1846. In 1837 he received the decoration of the Legion of Honour; and from 1842 till 1874 he was professor of Music at the Conservatoire of Paris. At the same time he managed a pianoforte factory, and in 1855 gained with his pianofortes the first prize at the Paris exhibition. His compositions, more than 200 in number, are mostly for the piano, and are characterised by melodic charm and a certain originality.

Herz, Henriette, a lady of great beauty, high intelligence, and wide culture, and a Jewess, who, in the beginning of the 19th century, made her home at Berlin a gathering-place for the intellectual life of the city. Amongst those who either met in her salon or were in correspondence with her were the Humboldts, Fr. Schlegel, Gentz, Varnhagen von Ense, Rahel, Schleiermacher, and Börne. She was horn at Berlin, on 5th September 1704, the daughter of a Jewish doctor of Portuguese origin, Benjamin de Lemos, and was married in 1779 to another doctor, Markus Herz. In 1817 she went over to Protestantism. She died on 22d October 1847. See her Life by Furst (2d ed. 1858), and her correspondence with Börne (1861).

Herzego'vina. See Bosnia.

Herzen, Alexander, a Russian author, was born at Moseow, 25th March 1812. In 1834, while yet a student, ho was imprisoned for his political opinions. From 1842 he published much, principally novels and political works. In 1846 he left Russia, and eventually established himself in 1851 in London. At this time his voice had great weight in influencing public opinion in Russia, chiefly by means of his paper Kolokol, of which thousands of copies were sanggled into Russia, in spite of the government prohibition. But Herzen gradually lost his influence as he became more and more a party-man, and especially by his advocacy of the cause of the Poles at the outbreak of their rebellion in 1863. He died at Paris, 21st January 1870. Of his numerous works may be mentioned the novels IVho is to Blame? and Dr Krupoff, and From the Other Shore, Letters

from Italy and France, Development of Revolutionary Ideas in Russia, Baptised Property (Serfdom), and The Social Condition of Russia. Many of these appeared under the pseudonym of Iskander. He also edited Memoires de l'Impératrice Cuthérine (1859), and the works of Pushkin, Lermontoff, &c. His collected works appeared in Russian in 11 vols. at Basel, 1875 et seg.

Herzog, Johann Jakob, a theologian of the Reformed creed, was born at Basel, 12th September 1805, and, after studying at Berlin, became professor at Lausaune (1830), Halle (1847), and Erlangen (1854). He died 30th September 1882. Amongst his works are a book on the Plymouth Anongst his works are a book on the Plymouth Brethren (Lausanne, 1845), lives of Calvin and Ecolampadius, a work on the Waldense-, and a church-history; but his name is best known for the grent theological encyclopacia edited by him, Realencyklopadie fur Protestantische Theologic und Kirche (22 vols. (Johla, 1854-68); new ed. by Herzog, Plitt, and Hanck (18 vols. 1877-88); English abridged ed. by Schaff (3 vols. 1882-84).

Hesiod, the earliest didactic poet of Greece of whom we have any knowledge, was born in Ascra, a small village at the foot of Mount Helicon. As a small village at the foot of Mount Helicon. As he himself informs us, in his boyhood he tended flocks on the mountain. On the death of his father he became engaged with his hother, Perses, in a lawsuit as to the division of their patrimony. His brother bribed the 'kings' or judges, and thus gained unjust possession of the property, which, however, he soon dissipated. But Hesiod prospered, and when Perses in his poverty applied to him for aid Hesiod gave him the good advice which forms the larger part of his Works and Days. According to a passage (if gennine, 646-662) in the same poem, Hesiod attended the funeral games of Amphiduanas at Chalcis, in Eubea, and there recited a hymn of his composition which gained him the prize. It was probably for some such festival that he composed the Theogony. Where or how Hesiod died we do not know. The only data we possess for fixing the time at which Hesiod we possess for fixing the time at which Hesiod lived are those contained in his works, for although Herodotus makes Hesiod contemporary with Homer, he can have had no sufficient evidence to go upon. The poems of Hesiod show acquaintance with a wider geographical horizon, especially westwards, than do those of Homer; the language is in a later stage, the digamma more frequently neglected; and, finally, in Hesiod there are unmistakable initiations of Homer. We may therefore suffly conclude that Hesiod was later than Homer. -possibly belongs to the end of the 8th century n. c.

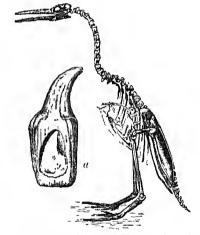
The Works and Days is generally considered to consist of two originally distinct poems, one continued to the statement of the statement of two originally distinct poems, one continued to the statement of th

taining the good advice to his brother, preaching up honest labour and denouncing corrupt and unjust judges; the other, the real Works and Days, containing advice as to the days lucky or unlucky, proper or improper, for the farmer's work. The Theogony teaches the origin of the universe out of Claos, the creation of earth and hell, of night and day, sea and sky, sun and moon, and the history of the gods. Bootian tradition denied that the Theogony was the work of Hesiod, but Herodotus affirms it (ii. 53), and the internal testimony and the similarity of the language of the Theogony and the Similarity of the language of the Theogory and the Works and Days confirms Herodotis. On the other hand, the Shield of Heracles, which has been preserved, and the Catalogue of Women and the Eow, which have not, were not gennine. The corrosive criticism which has been poured on the Honeric poems has also been applied to the Hesiodic; and here too the critics are not agreed whether the unity of the poems is the work of the original com-poser, and has been disturbed by interpolations, or is the work of some late editor harmonising lays originally unconnected. The dialect (Old Ionic) in which the He-jodic poems are composed has also been attacked. Fick maintains that the Theogony was composed in the Delphic dialect, the Works and Days in ancient Eolic, and that they were subsequently rewritten in artificial Ionic.

Hesiod wrote not to please the imagination, but to improve the mind. Honer told tales, the tale of Troy, of Achilles, of Odyssens, 'lies like unto the truth,' as Hesiod would say. Hesiod's object was to tell the truth. His poetry is not very poetical, but it has its interest. In the first place, it is what the Greeks learned by heart as children and quoted as men for their moral guidance. In the next place, the Works and Days gives us an invaluable picture of the village-community as it existed in Greece in the 8th century B.C., and of the 'kings' of Homer as they appeared to the villagers. Finally, the Theogony is of the utmost importance to the comparative mythologist. The first edition of Hesiod appeared at Milan, 1493; other editions, Schömann (1869), Fick (1887). See also Gruppe, Dic gricch. Kulte u. Mythen, i. 567-612.

Hesper'ides, the name of the sisters who, assisted by the dragon Ladon, guarded the golden assisted by the dragon Laton, guarded the golden apples which Hera had received, on her marriage with Zeus, from Gaca. Their genealogy and their number are variously given by mythologists. The gardens of the Hepperides were placed far in the west, on the verge of the occan, or in the land of the Hyperboreans. The apples were stolen by Herenles (q.v.), but were afterwards restored by Athena. See ATLANTIS.

Hesperornis, a remarkable extinct form of bind, the remains of which have been met with in the American Cretaceons deposits. As described by Professor Marsh, it possessed small pointed reptilian teeth, which were implanted in a deep



Restoration of Skeleton of Hesperornis regulis: a, tooth of do. with germ of second tooth (magnified).

continuous groove, somewhat like those of Ichthyosaurns. Its brain was small and more reptilian in type than that of any adult bird as yet examined. It appears to have been a large diving-bird, measuring over 5 feet from the point of the bill to the end of the trees. Its wings were rudinentary, its legs powerful, and its feet well adapted for rapid propression in water. The tail was broad, could move up and down, and was probably used as a rudder or swimming-paddle. The long slender jaws were united in front only by cartilage, as in serpents, and had on each side a joint which admitted of some motion, so that 'the power of swallowing was doubtless equal to almost any emergency. ODONTORNITHES.

Venus as the evening star (see Planer). Hence the Alexandrian grammatians called Italy, and wastern Europe. Hesperia, 'the Hes'perus, the Greek name (Lat. 1'rsper) for western land.

Hesse (Ger. *Hessen*), or Hesse-Darmstadt, a grand-duchy of the German empire, lying between 7° 51′ and 9° 39′ E. long., and 49° 24′ and 50° 50′ N. lat. A strip of Hesse-Nassau divides it into a northern part, Oherhessen, completely enclosed by Prussia, and a southern part, comprising the two provinces of Starkenharg, east of the Rhine, and Rheinhessen, west of the Rhine. Besides these two main parts there are cleven enclaves in Baden and Prussia, the largest Wimpfen and Hohen-stadt. Oherhesen is partly occupied in the east by the Vogelsberg, enhinating in Tanistein (2532 feet), in the south-west by a manification of the Tanines, the fertile and madulating valley of Wetteran lying between them. Starkenburg, in the south-cast, is covered by the larger part of the Odenwald. The Bergstrasse divides the uphands of Starkenhurg on the east from the plain of the Rhine on the west. This plain merges in the north into the plain of the Main. Theinhessen, fertile and populous uplands, laid out bugely in vineyards, the principal industry of the province, lies between the three points, Krenzmed, Mainz, and Worms. With the exception of the streams to the cust of Vogelsberg draining into the Fulda, the waters of Hesse—Rhine, Main, Neckar, and Lahn—belong to the Illine system. Of the total surland and gardon, and 31 forest. The most important products are corn—particularly in the Rhino and Main plains, and in Wetteran—pulse, negatives range products the corn—farticularly in the Rhino and Main plains, and in Wetteran—pulse, negatives range property theorem. potatoes, rapa, poppy, tobacco, flax, fruit, and vines. Hesse yields iron, nanganese ore, and peat. The industries—mainly in Mainz, Offenbach, and Worms—include the making of leather, boots, fine uphalstery, tobacco, eigars, chemicals,

&c.
The total population amounted in 1875 to 882,349, in 1885 to 956,611. Of these 402,378 belonged to Starkenburg, and 643,881 were Protestants, 278,440 Catholies, and 26,114 Jews. Mainz has a population of 65,852; Darmstadt, the capital, 42,794. Hesse has a university at Giesen, with 546 students (1888), and a technical university at Darmstadt, with 279 students.—The government is constitutional, the legislative power consisting of two chambors. The annual revenue for the period 1889-91 was estimated at £1,290,220, and the expenditure at £1,100,560.

The Hessen were an ancient German tribe, and their territary came to be included in the principality of Thuringia. We first hear of the land-grave of Hesse in the 13th century. On the death of Philip the Magnanimous in 1567 the land-graviate of Hesse was quarteted among his four sons, into Cassel, Marburg, Rheinfels, and Darmstadt. The House of Rheinfels becoming extinct in 1592 and their of Marburg in 1604. Here a new in 1583, and that of Marburg in 1604, Hosse was reconstituted in two divisions—Hesse-Cassel and Hesse-Darmstadt. After the French Revolution Lonis X., under pressure of France, signed a troaty of neutrality, and (1805-13) supplied Napoleon with In 1806 Louis assumed the title of grand-duke. In 1813, after the battle of Leipzig, Louis joined the allies, and in 1815 had to acknowledge the independence of Hosse-Homburg. In 1866 Hosse, having sided with Anstria, had to yield up certain territories. territories, including Hesse-Homburg, recently acquired, to Prussia. In 1820 was founded a new constitution of government, modified in 1856, 1862. and 1872.

Messe-Cassel, till 1866 a German electorate, now forming the government district of Cassel in the Prussian province of Hesse-Nassau (q.v.). Area, 3700 sq. m.; pop. (1864) 745,063. The landgraviate of Hesse-Cassel was found by William IV., in 1567. Constituted an electorate in 1803, it was occupied by the French in 1806, incorporated with Westphalia in 1807, and reconstituted an electorate in 1813. The elector having joined Austria in 1866. Hesse-Cassel was incorporated with Prussia, as part of the province of Hesse-Nassan,

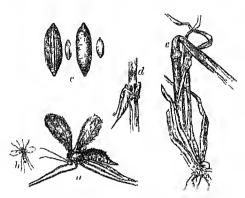
Hesse-Homburg, till 1866 a landgraviate of Germany, consisting of the lordship of Homburg yor der Hohe, on the right hank of the Rhine, and the lordship of Meisenheim, on the left bank, Area, 106 sq. m.; pop. (1864) 27,374. Since 1866 Hesse-Houlburg has been incorporated with Prussia, Homburg now forming part of the district of Hesse-Carsel, and Meisenheim of that of Ceblenz, Hesse-Homburg was constituted a landgraviate in 1596. In 1806 Hesse-Homburg because again incorporated with Hesse-Daunstadt, but in 1815 was decreed independent, while it was enlarged by the addition of the district of Meisenheim. In 1866 Hesse-Homburg reverted to Hesse-Darmstadt; but the grand-duke, having e-ponsed the cause of Austria in the seven weeks' war, was forced to surrender Hesse-Homburg to Prussia.

Hesse-Nassau, a province of Prussia, between Bayaria and Saxony on the east and the Rhine on the west, was formed (1867-68) out of parts of the former electorate of Hesse (lassel, of the former Duchy of Nassau, of the lerdship of Homburg forming part of the former countship of Hesse-Homburg, of the larger part of the fermer free town of Frankfort-on-the-Main, and small parts of Bayaria. It comprises 5943 sq. m. The surface consists mostly of uplands, contrasting with the Main plain and part of Wetteran in the south, and with the narrow valleys of the Werra and Fulda, and the fertile basin of the Schwalm in the north. The hills covering its surface include the Taunus and the Westerwald, rising to 2986 feet; the Hohe Rhou, rising in Grosse Wasserkuppe to 3096 feet; the Lahn Monutains, &c. The Thuringerwald traversing Schmalkalden culminates in the Inselsberg (3001). Among the minerals are iron, copper, lead, manganese, and building-stone. It is rich in mineral waters, such as at Wiesbaden, Ems, Kronthal, Homburg, &c. The manufactures include gold and silver wares at Cassel, leather at Eschwege, damasks and other stuffs at Fulda, iron-foundries at Hanan, &c. The population in 1875 was 1,467,898; in 1885, 1,592,454; 1,110,831 being Protestants, 431,520 Catholics, and 43,145 Jows. Of its 108 towns only seven (Frankfort, Cassel, Wiesbaden, Hanan, Boekenheim, Marlorg, and Fulda) have more than 10,000 inhabitants each. Hesso Nassan has a university at habitants each. Hesse Nassau has a university at Marling, twelve gynunsinins, thirty-eight 'Real-, commercial, and higher schools, seven teachers' seminaries, three deaf and dumb and two blind institutes. The principal occupations are agriculturally schools and seven teachers' and the schools are agriculturally seven the seven the seven that the seven the seven that the seven the seven that the se ture, cattle-rearing, the usual industries, and mining.

Hessian Fly (Cecidomyia destructor), a dipterous insect, which in its larval state is one of the most important crop-pests, attacking stems of barley, wheat, and rye. The eggs are usually laid on the leaves twice a year, in Alay and September, and the leaves, which hatch in a fortnight, bore into the stem, suck the juices, and destroy the plant. The larve turn to pupe in the end of July,

699

or in spring, and thence the flics develop in about ten days. The egg is very minute, about \$\frac{1}{2}_0\$th of an inch, and pale red towards hatching. The larva or maggot has a shining, oval body, white or yellowish, with a soft fleshy head and twelve segments.



Hessian Fly (Cecidompia destructor): a, magnified; b, natural size; c, pups cases ('flav-seeds') in different stages, natural size and magnified; d, barley stem, showing 'flav-seeds' in situ; e, stem elbowed down. (Trom Miss Ormerod.)

The mouth parts are very uccess, which is hind end is a chitinous 'anchor process,' which is The month parts are very delicate, but near the hind end is a chitinous 'anchor process,' which is probably used as a digger or scraper. The pupacases, which are called 'flax-seeds,' are about 4th of an inch in length, of a long oval shape, and of a brownish or chestnut colour. The fly itself is a little stout-made black and brown gnut, about 4th of an inch in length.

The fly was first known as a scourge in North America during the years 1786 and 1789, and owes its name to the erroneous supposition that it was

America during the years 1750 and 1755, and owes its name to the erroneous supposition that it was imported by the Hessian troops, mercenaries of Great Britain. In England it appeared in 1788, and was described by Sir Joseph Banks. 'It is now known to exist in the south of France, Austria, Hungary, and southern Russia, and its original habitat is considered most probably to have been southern Emope and western Asia. In 1886 it occurred in Britain, and in some districts is said to have caused pritain, and in some districts is said to have caused a loss of several bushels per acre. In some years the loss in America has been enormons; as in the years 1790, 1821, 1844-45, 1871-72, 1876-78. Late sowing, 'ploughing in' infested stubble, the use of 'hait' patches of corn, rotation of crops, the selection of strong-stemmed corn, and the like are suggested preventions of the seourge.

See CECIDOMYIA, CORN INSECTS; E. A. Ormerod, The Hessian Fly (Lond. 1886); A. S. Packard, 'The Hessian Fly, its ravages, &c.' in U.S.A. Third Rep. of Entomoloy. Comm. (Washington, 1883); H. A. Hagen, 'The Hessian Fly not imported from Europe,' in Canad. Entomologist (1880); B. Wagner, Die neue Getreide Gall-Mucke (1861).

Hesychasts (Gr. hesychazein, 'to be quiet'), a mystic and contemplative sect of the Greek Church in the 14th century, who may be described as the Quietists of the East. A Basilian monk, named Barlaam, a native of Calabria, in the course of a visit to the monasterics of Greece, observed among the monks of Mount Athos several practices and doctrines which he considered grievously reprehensible, but one in especial. Believing that in the soul lay hidden a certain divine light, which it was the office of contemplation to evoke, the monks withdrew at stated times to a retired place, seated themselves on the earth, and fixed their eyes steadfastly on the centre of the stomach (whence the soubriquet by which they were known, omphalopsyrhoi, 'navel souls'); and they averred that after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region), and filled them with ecstasy and supernatural delight. The monks were defended by Gregory Palamas, the Archbishop of Thessalonica; and councils in 1341 and 1351 pronounced in their favour. But the public voice was hostile to the cost and they con fell into obscurity. See Stein's seet, and they soon fell into obsentity. See Stein's monograph (Vienna, 1874).

Hesychius, a Greek grammarian of Alexandria, flourished probably towards the end of the 4th century A.D. He was the author of a Greek lexicon, containing words and pluases, obscure, rare, and dialectical, which, in spite of the corruption of the text, is one of the most useful books we have for anderstanding the works of the great classic witers of Greece. The best edition is that published by Alberti and Ruhnken (2 vols. Leyden, 1746-66), to which additions were made by Schow (Leip. 1792). -Not to be confounded with the foregoing is the historian Hesychius of Miletns, surnamed the 'Illustrious,' who flowished in the beginning of the Greek writers, treating especially of the philosophers, and a universal history from the carly days of Assyria down to the year 518 A.D. Only a small portion of this last is extant. See Orelli, Hesychii Öpera (Leip. 1820).

Heterocercal (Gr. heteros, 'different,' 'unequal,' and kerkos, 'a tail'), a term introduced by gassiz to designate the unsymmetrical tail of Elasmobranch and most Ganoid fishes, in which the vertebral axis is bent upwards in the tail, making the upper lobe much the larger (see the article STURGION). In bony fishes also the axis is somewhat bent upwards in its termination, but the asymmetry is disguised, and the tail looks equallobed or homocercul. In some Teleosteans and Ganoids, in a few Elasmobranelis, and in Dipuol, the tail is generally translated at Michaelle. the tail is genninely symmetrical or diphycered.

Heterop'oda, pelagic Gasteropods, in which the 'foot' has become a swimming organ. In association with their active life on the surface of the occan must be noted not only the locomotor foot, but the protective transparency, the highly-developed nervous system and sensory structures, eyes, ears, and smelling organ. The toothed ribbon in the month is also very elaborate. Technically the Heteropods are included among the Azygo-Atlanta, with a large visceral dome and shell; Carinaria, with a reduced hump and small cap-like shell; and Pterotrachea, without a hump or shell, me the three types. See GASTEROPODA, shell, are the three types. MOLLUSCS.

See HEMIPTERA, WATER-Heterop'tera. SCORPION.

Hetman, or ATAMAN, the title of the head or general of the Cossacks (q.v.).

Hevelius (whose real name was Hovel or Hovelke), Johann, German astronomer, was born at Danzig, 28th January 1611, and died in that city, 28th January 1687. He was wealthy, and in 1641 he erected an observatory in his own house, and for forty year- carried on astronomical observations therefrom. He wrote descriptions of the phases and spots of the moon, conducted numerous researches on comets, and prepared charts of the moon and of the heavens. He laid down the results of his observations in Science aphia (1647), Cometographia (1668), and Machina Calestis (1673; reprinted, with an English trans. by Prince, in 1882), besides minor works,

Heves, a town of Hungary, 60 miles ENE. of Pesth. Pop. 6698.

Hexachord, in modern music, denotes the six diatonic degrees of which Guido formed his scale. See Guido, and Scale.

Hexagon (Gr. hex, 'six,' and yānia, 'angle'), a figure of six sides and six angles; when the sides and nugles are equal it is called a regular hexagon. Of the three figures which can completely eccupy space (the equilateral triangle, square, and hexagon) the hexagon contains the greatest area within a given perincter, the proportions between the three different figures being nearly as the numbers 4, 51, 6. It is thus that bees, by making their cells of a hexagonal form, enclose the greatest space with the least expenditure of wax. See Bres.

Hexaltedrom, a solid figure bounded by six faces—the cube being one inch.

Hexameter, the name applied to the most important form of classical verse. It is the heroic or epic verse of the Greeks and Romans, the grandest examples of which are the *Iliad* and *Odyssey* in Greek, and the *Epoid* in Latin. It consists, as its name implies, of six feet or measures, the last of which must be a spondec (a measure the last of which must be a spondec (a measure composed of two long syllables), and the penultimate a dactyl (one long syllable and two short). If the penultimate is also a spondee, the verse is said to be spandaic. Klopatock, (toothe, and Voss have produced admirable specimens of hexameter verse in (terman; and it has become familiar in English through Longfellow's Evangetine, Kingstey's Andromedic, and Clongh's Bothic of Tober-na-Vuolich. The following lines from the last show the only varieties of the hexameter which are endurable to the ear—i.e. those in which the accent an each foot falls on its first syllable:

Füll she in | mfridd | springs her | sources | für in the | moun-17ms, Stirring, col | 17sting, | heaving up, | rising, | torth out | Howing.

It will be observed that on whatever syllable here the metrical accent falls, that syllable is precisely the same which the voice naturally accentuates. Whether this was the case in ancient Greek and Latin hexameters we do not know, but, if the present system of Greek accentration represents the natural accent of Homeric words, it is certain that Homer disregarded the natural accents, or did not abserve our rule of always placing the metrical accent on the first syllable of each foot; and we still pronounce Latin hexamoters by preserving what we take to be the natural accent of each word, whether that corresponds to the metrical accent or not. Thus in the line

Italf | am la | to profit | gus La | vintaque | vent

we disregard the metrical accent, which should fall on the first syllable of each foot (and actually does so in the fifth and sixth), and in reading the line give effect to the natural accents only, as we con-ceive them, of the words Italiam, futo, profugus. Professor T. Arnold, in the appendix on metres in his Manual of English Literature, points out that when English hexameters were first written they were constructed in the same manner; they were to be read in the same way as Latin hexameters. The natural accent, except in the last two feet, overruled the metrical. In the following lines from Stanihurst's translation of the Envid it will at ence be seen that the effect is absurd if we read the lines as modern English hexameters are read ;

Either here | are couch | ing some | troops of | Greekish as |

sombly,

Or to crush | our bul | warks this | work is | forged, all | houses
For to pry, | surmount | ing the | town; some | practice or | other

Here lurks | of oun | ning; trust | not this | treacherous | ensign.

If we read by the natural accent the effect is rough and harsh to the ear; if by the modern metrical,

ridiculous and absund. Such are the limitations of the hexameter in English.

Hexapla (Gr. hexapla, 'the sixfold'), a celebrated edition by Origen of the Old Testament Scriptures, consisting of the Hebrew text, with a transcript in Greek letters, the Septragint, and the versions of Aquila, Symmachus, and Theodotion. It is no longer extant. See ORIGEN, SEPTUAGINT.

Hexham, an ancient town of Northumberland. beautifully situated on the right bank of the Tyne, 24 miles W. of Newcastle by rail. A stone bridge of nine arches spans the river, and the town is intersected from east to west by one long street, called in its different parts by the names of Priest-papple, Battle-hill, and Hencotes. Two narrow streets connect with the market-place, one of the most interesting and picturesque in England, from which again other nurrow streets diverge irregularly. The great point of interest is the Abbey Church of St Andrew, a noble monument of 13th-century architecture, of which the greater part of the choir, except the eastern chapels, and both the transents alone remain, the building having been subjected to shameful restoration in 1858, and again in 1869. The monastery was originally founded by St Wilfrid in 674, and his church was long celebrated by the chroniclers as the finest on this side the by the chroniclers as the finest on this side the Alps. Here in 681 a bishopric was established which lasted till 821, when Tidferth, the last bishop, died on a voyage to Rome, having been driven off by the Danes. The ruined church was relmilt in 1112, and a priory of Austin canons founded, but the monastery was suppressed under Henry VIII., and its last prior hanged at Tyburn for taking part in the Pilgrimage of Grace. The nave of the church was destrayed by the Saratia nave of the church was destroyed by the Sects in 1296, and was never rebuilt. Under its rains was discovered the Saxon crypt of St Wilfrid, a won-dorful survival of our carliest architecture, with strange barrel vaults, lamp niches, and finnel-shaped apertures, only to be matched at Ripon. It has been discovered that it was lufit of Roman stones, most likely carried from the eld Reman station of Gorstopitum, but 3½ miles distant. The contral tower is 100 feet high, and of its eight ancient hells one is still called the 'Fray Bell,' from having been rung to give warning in Border The stone Frith-stind is supposed to have heen Wilfrid's chair. heen Wilfrid's chair. The best remains of the monastery are the refectory and the abley gate-way of Norman architecture. To the west of the churchyard is the Seal, once the park of the monks, now a public promenade. Near Hexhuu the Langustrians were severely defeated, May 15, 1464. The chief manufactures of the town are gloves and hats. Pop. (1871) 5331; (1881) 5919.

See Wright's History of Hexham (1823); The Priory Soo Wrights History of Hecham (1823); The Prory of Hecham, its Chronicities, Endowments, and Annuls, edited for the Surtees Society by James Raine (1864-65); Hewite's Handbook to Hecham and its Antiquities (1879); and especially the admirable and sumptious work by Charles Clement Hodges, The Abbey of St Andrew, Hecham (privately prented, 1888).

Heylin. Peter, an English divine of considerable note in his own day, was descended from an ancient Welsh family belonging to Montgomeryshire, and was born at Burford, in Oxfordshire, November 29, 1599. He studied at Oxford, where he took the degree of D.D. Through the interest of Laud (q.v.), Heylin was appointed chaplain in ordinary to King Charles in 1629. He was deprived of his livings under the Commonwealth: but after of bis livings under the Commonwealth; but after the Restoration was unade sub-dean of Westminster. He died May 8, 1662. Heylin was a very voluminous controversial writer on the anti-Puritan side, and wrote cosmographies, histories of England, of the Reformation, and of the Presbyterians. See FULLER, THOMAS.

Heyne, Christian Gottlob, a German classical scholar, was born at Chemnitz, in Upper Saxony, 25th September 1729, the son of a poor weaver. In spite of extreme poverty and often absolute lunger, Heyne struggled perseveringly at Leipzig; and in 1753 he obtained the situation of under-clerk in the Brühl library at Dresden. An edition of Tibullus and one of the Euchiridion of gained for him the patronage of the Eminter of gained for him the patronage of the celebrated scholar, Rubuken of Leyden. But the outbreak of the Seven Years War threw Heyne out of employment, and for some time he led a precarious life, being often without bread, and supporting himself as best be could by writing for booksellers. But in 1763, on the recommendation of Ruhnken, he was appointed professor of Eloquenec at Gottingen, and the rest of his long life was spent in comfort and professorial activity. By his lectures and the thorough knowledge he displayed of all departments of ancient Greek and Roman life, he was chiefly instrumental in raising Gottingen to its pre-eminent position as a school of classical study. He is said to have trained more than 130 professors. Heyne died 14th July 1812. His principal works, besides those mentioned, are his editions of Virgil (1767; new ed. 1830-44), Pindar (1773), Apollodorus (1782), and Homer's Iliad (8 vols. 1802); numerous translations of the volume of the standard of the s translations; six volumes of Opuscula Academica (1785-1812); and about 7500 reviews of books in the Gottinger Gelelrte Anzeigen, of which he was editor from 1770. Compare the Life of Heyne by his son in law, Ladwig Heeren (1813), and Carlyle's e-say in vol. ii. of the Miscellanies.

Heyse, Paul Johann, German poet, dramatist, and novelist, was born in Berlin on 15th March 1830, and educated at Berlin and Bonn. He was one of the band of writers whom King Max of Bavaria gathered around him in Munieh in 1854. Freed from the necessities of earning a livelihood, Heyse has developed an astonishing productiveness. As a writer of novelettes he is an acknowledged master, his work in this department being mostly of the nature of genre-pictures in words. He is not wanting in sly humour, exhibits considerable executive skill and fertility of invention, shows artistic attention to details, and writes in a graceful style; but his work is frequently marred by sensuousness and immoral feeling. He has published more than a score of collections of novelettes under various titles, good specimens of which are contained in Das Buch der Freundschaft (1883-84). His poetic works include narrative poems, such as Urica (1852), and epics, such as Die Braut von Cypern (1856) and Thekla (1858). As a dramatist he has been almost as voluminons a writer as in the domain of novels; but few if any of his dramatic pieces have been unequivocally successful. He has also written a couple of more ambitious novels, Die Kinder der Welt (1873; 7th ed. 1880) and Im Paradiese (1875; 5th ed. 1880), which have been very warmly praised. Nor is his industry yet exhausted; he has translated the poetical works of Giusti (1875), of Leopardi (1874), and of Parini, Monti, and Manain (1889).

Heywood, a municipal town of Lancashire, 3 miles E. of Bury and 9 N. of Manchester. It is connected with the Rochdale Canal by a branch canal, and is on the Lancashire and Yorkshire Railway. Incorporated in 1881, Heywood has increased with great rapidity, both in population and wealth, since the beginning of the 19th century, partly in consequence of extensive coal-mines in the neighbourhood and partly in consequence of the enterprise of the Peel family, who introduced there the cotton manufacture. Iron and brass founding, boiler-making, and the manufacture of

cotton, woollens, machinery, railway plant, and chemicals are carried on. The Free Libraries Act was adopted in 1873; and the Quéen's Park, 20 acres in extent, was opened in 1879. Pop. (1851) 12,194; (1881) 22,979.

Heywood, John, the epigrammatist, was born near St Albans about 1500. After his studies at Oxford he was introduced at court by Sir Thomas More, and soon made himself by his merry wit and his skill in music a favourite with Henry VIII., and later with Mary. He was a devout Catholic, and on the accession of Elizabeth betook himself to Malines, where he died in 1565. He wrote several short plays which he called interlndes. The name had hitherto meant short dramatic pieces performed in the intervals of a hanquet or court-pageant, in which the characters were merely personified qualities, but Heywood introduced the novelty of making these individual persons remesent classes, as the Pedlar, the Pardoner, and the like, instead of Youth, Felicity, &c. His interlndes thus form an important stage between the old moralities and the modern drama. Among them are Johan, Tyb his wife, and Sir Johan the preceste; A Mery Play between the Pardoner and the Frere, the Curate and Neighbour Pratte: and The Play called the four P's, a new and very Merry Interlude of a Palmer, a Pardoner, a Poticary, and a Peallar. His three collections of Epigrams reach the number of six hundred. His longest work is the wearisome allegorical poem, The Spider and the Fly, in which the relative merits of Catholics and Protestants are contrasted.

Heywood, Thomas, dramatist and actor, a Lincolnshire man, was educated at Cambridge. He seems to have been writing plays as early as October 1596; and on 25th March 1598 he was regularly engaged by Philip Henslowe as an actor. Of all the old dramatists he was the most prolific. We learn from the preface to The English Traveller that down to 1633 he had 'had either an entire hand, or at the least a main finger,' in the composition of 220 plays; and he continued for some years after that date to write for the stage. He was also the author of an historical poem, Troja Britannica (1609, folio); an Apology for Actors (1612); Nine Bookes of Various History emecrainge Women (1624); a folio of nearly five hundred pages, which was planned, written, and printed within the space of seventeen weeks; a long poem, with learned and curious annotations, The Hierarchic of the Blessed Angells (1635, folio); a volume of playined translations from Lucian's Dialogues, Erasmus, Ovid, &c.; various mayoralty pageants, and divers tracts and treatises. His projected Lives of all the Poets, Modern and Foreign, was unfortunately never published. In 1624, and again in 1635, he refers to this work; and we know from Richard Brathwait's Scholar's Medley that he was engaged upon it as early as 1614. The last of Heywood's publications was The Life of Ambrosius Merlin (1641). It is usually supposed, but without sufficient evidence, that he was alive in 1648, when he was mentioned in the Satire against Separatists.

Twenty-four of Heywood's plays have come down. The best is A Woman kilde with Kindnesse (1607), a pathetic tragedy of domestic life; and with this may be coupled The English Traceller (1633), which contains some admirable scenes, but ends somewhat abruptly. Heywood was particularly successful in depicting blameless English gentlemen, such characters as Master Frankford in the earlier play and young Geraldine in the later. His work is usually distinguished by naturalness and simplicity; but he wrote at the beginning of his eareer one absurdly grandiose play, The

Foure Prentises of London, printed in 1615, which was parodied in Beannont and Fletcher's Knight of the Burning Peetle. In the two parts of The Fair Maid of the West (1631), and in Fortune by Land and Sea, partly written by William Rowley and first printed in 1655, he gives us some spirited descriptions of sea-lights. The Fayre Mayde of the Exchange (1607), a sentimental comedy, has a very improbable plot; The Rape of Lurrecce (1608) is chiefly noticeable for its songs; Lore's Maistresse (1636), dealing with the story of Cupid and Psyche, is fanciful and ingenious; and there is much tenderness in A Challenge for Decardie (1630). In the Four Ages—The Golden Age (1611), The Silver Age (1613), The Bureau Age (1613), and the two parts of The Iron Age (1632)—Heywood dramatised classical mythology, 'from Impiter and Saturn to the after sulversion of Troy.' These plays are undeniably tedions, but contain some clauming poetry. The Late Lancoshira Witches (1634), written in conjunction with Richard Brone, is largely of a furcical character; and The Wise Woman of Hoysdon (1638) exposes the trickeries of fortune-tellers. In The Boyall King and Loyall Subject (1637) the doctrine of passive obedience to kingly authority is carried to extreme lengths. The early plays, Eheered IV. (2 parts, 1600) and If You know not Me You know No Bodie; or, the Troubles of Queen Elizabeth (1605–32), are of small account; nor can much be said in favour of A Mayden-Head Well Lost (1634). The Captives, or the Lost Recovered, an interesting play acted in 1624, was liest published in 1885 from Egerton MS. 1994 (Bullen's 'Old Phys,' 1st series, vol. iv.). A collection of Hoywood's plays, in six volumes, was issued in 1874 (London, John Pearson). In tragic power he was deficient, but his gentleness and sincerity endear him to students.

Hezekiah (Heb. Hiskiah, Yehiskiyahu, 'May Jehovah strengthen him'), a reforming king of Judah, son and successor of Ahaz, reigned from 728 to 697 n.C. His reign is remurkable for the invasions by the Assyrians under Sargan, and again under Sarmacherib. When Semucherib appeared hefore Jerusalem 'an Angel of the Lord' (explained variously to mean the plague, an earthquake, a sudden attack by Tirhaka, or the simoom) slew during one single night 180,000 men in the Assyrian camp, and Semuacherib was obliged to retreat. (See 2 Kings, xviii.-xx., and 2 Chron. xxix.-xxxil.) The events of this period as recorded in Assyrian records are treated at Assyria (q.v.). After the war he collected great treasures and excented many highly useful works, among which the aqueducts of Jerusalem take a foremost place. His was also the golden age of prophetic poetry. He was succeeded by his son Manasseh.

Hiawatha, the name by which the Iroquois call a personage of miraenous birth (elsewhere amongst the North American Indians known as Michabon, Chiabo, &c.) sent amongst them to clear the rivers and forests, and teach the arts of peace. Longfellow's poem (1842) is based on Schooleraft's version of the tradition ('Algic Researches,' 1839; republished as The Myth of Hiawatha, 1856).

Hibbert Lectures, a foundation instituted by the trustees of Robert Hibbert, a West India merchant, who died in 1849. For many years the trustees applied the funds mainly to the higher culture of students for the Unitarian ministry, but in 1878 resolved to institute Hibbert Lectures, with a view to capable and really honest treatment of unsettled problems in theology, apart from the interest of any particular clurch or system. Amongst the lectures have been Max Müller, Page Renouf, Renan, Rhys Davids, Kuenen, Beard, Reville, Pleiderer, Rhys, Sayce, and Hatch.

Hibernation (Lat. hibernare, 'to pass the winter'), a physiological term employed to describe the habit which certain northern, and most probably some Antarctic mammals, reptiles, fishes, insects, and molluses have of passing part of the year, almost invariably the coldest winter months, in a more or less continuously torpid condition, from which they revive either at irregular intervals, or altogether on the return of warm weather. Hence the Germans express this condition by the word winterschluf ('winter sleep') in contradistinction to sommerschlaf, 'sammer sleep' or astivation, an analogous, though not identical, trait of some southern animals during the summer months.

As far as manuals are concerned, the following are the principal facts established: (1) All northern species, even those which had food scarce during winter, do not hibernate, nor do all the species of the same family, order, or genus. Even both sexes of the same species do not always agree in this respect. The bear, the badger, the domonse, the hamster, the hat, the marmot, the zizel, and the hedgehog are among the best known and most prononneed hibernators. But while all the hurrowing marmots, whistlers, woodchucks, ground-hogs, &c. naturals, this term, a concentration, from the alpine marrants (Arctimus marrants) indulge in this habit by fits and starts. The sloth hear (Melurus Inhiatus) and other Indian Ursida differ from the other members of their family in remaining awake during winter, though they are sluggish during this season, moving about very little, and then only occasionally when they require food; and both the black and brown bear of the Rocky Mountains black and brown bear at the Rocky Montains and the polar hear are strict hibernators only as regards their foundes, the male heing often seen at large between November and May. Most of the American squirrels differ from the European species in being non-hibernating. (2) The same animal may vary in this respect in different portions of its range. Thus, though the American skynks are in the northern part of the region over which they roam more or less complete region over which they roam more or less complete hibernators, they get more and more wakeful as their range extends equatorially, until in the most southern part of it they more about freely at all seasons of the year. In like manner, the prairie 'dog,' or marmot (Cynomys Indoricianus), in the northern phains retires to sleep during severe weather, as do also the woodchucks of the same region, but in open winters and an pleasant days they display no such tendency; while in the extreme southern limits of their range they are not hihernators at all. (3) They do not all retire at the same time. Most of the true hihernators take to their 'hibernaculum,' or winter hole—a hurrow, a hollow tree, a cave, the caves of a house, or similar situation—in late autumn, varying the date slightly according to weather. Int the great bat (Scotophilus nortala) is rarely seen after Septemher, and aften retires as early as the end of July, when its insect food is alundant. (4) All of them when its insect food is alundant. (4) All of them do not sleep the same length of time, or with the on not steep the same length of time, or with the same torpidity, and several indulge in hihernation and waking alternately during the winter. The squirrel, in Britain, lies dominant most of the cold season; but on sunshiny days it often wakes, visits its hoards of food, eats freely, and then retires to rest again. The hedgehog is sometimes seen during the winter; and on sunshiny days the common hat often emerges from its hibernaculum. common hat often emerges from its hibernaculum, and flits about even when snow is on the ground. The dormonse also at intervals wakes up, eats, and goes to sleep. Other animals, like the long-tailed lield-mouse, pass the winter in a drowsy state not far removed from dormancy. There are thus all gradations between continuous winter dormancy

and the ordinary daily sleep of a few homs in which every animal indulges. There is also every degree of torpidity exhibited. The hedgehog and the dormonse may be rolled over and over like a ball, without waking, and the black bear of America is extremely difficult to arouse out of its winter sleep. On the other hand, the brown bear of Siberia hibernates lightly, and is very dangerons when awakened. The hedgehog, if disturbed, takes a 'deep sonorous inspiration, followed by a few feeble respirations, and then by total quiescence.' This differs from the stirring and then coiling itself up again which is the animal's way when awakened ont of an ordinary sleep. But, though sensation and volition are dormant, the rellex and excitomotory actions are keen, the slightest touch applied to the spines of a hedgehog or to the wings of a hat inducing one or two inspiratory movements. But the hibernating badger is not difficult to recardle and in the towns like all difficult to reawake, and in its torpur, like all hibernating animals, is not rigid. (5) Continuous hibernators do not lay in stores of food. Intermittent winter sleepers generally do, while some animals which are not true bibernators, but remain animals when are not true histories, but remain only drowsy during the winter, retire to their histories to pass the days of famine above ground in the midst of their abundant nuts and other provender. All of these food-stores are vegetable-eaters. The arctic fox is indeed the only exception to this rule, for though it is not any more than the heaver a hibernator, it hourds up dead learning arms are true to be. lemmings, ermines, geese, hares, &c. against the evil days of winter. An exception to intermittent hibernators being thus provident is afforded by the porcupine (Hystria cristatu) and the alpine mar-

In its most pronounced forms hibernation differs physiologically in several important stepordinary sleep, though it is undoubtedly linked with this function by a regular chain of links. Cold we know produces drowsiness, which ends in a fatal torpor, and on warm days a sleep steal-over the eyes which might, in kind if not in degree, he compared with the astival torpor of some animals. In other respects, hibernation is more akin to trance. Yet what is most puzzling about it is that it affects only some animals which differ little in habit from others which keep awake all winter, and in the same region find food in alumdance. The polar bear sleeps while scals are plentiful on the ice-floes, and the Noctule bat retires while the cockehafers, in which it delights, are numerous. Still, as it enables animals to live within their area which might otherwise require to migrate, we cannot refuse to admit that hibernation plays an important part in the struggle for existence, the survival of the fittest, and the means whereby animals are confined within certain zoogeographical regions. But how it originated, or whether it is a survival, like migration, from a former condition of things, are problems which in the present state of our knowledge cannot be satisfactorily solved.

Hibernators, when they retire for the winter, are unusually fat: when they emerge from their hibernaculum they are unwontedly lean. They all try to keep warm, the heat of their hody being nearly that of their hibernaenhum. Yet if exposed to greater cold they revive, and, if the temperature is still further lowered, like other animals they freeze to death. Reviviscence is probably due to the calls of nature, the observations of Horvath on a zizel (Spermophilus citillus) showing that the heat of the circumambient air does not rise while the animal is awaking, though the temperature of its body does. During dormancy the animal functions are all but suspended. Excretions in the bat are reduced to almost nothing, and the

bears close the lower end of their alimentary canal by a resinous plug, known in Sweden as tapnen. Respiration and circulation are reduced to a minimum. The air of a closed jar containing a hiber-nating dormouse is unaltered. Others can survive long in an atmosphere deprived of oxygen. A bat in a lethargic condition has remained sixteen minutes under the water; and though three or four minutes' immersion will, under other circumstances, suffice to drown a hedgehog, in a state of winter torpidity it can bear twenty-two and a half with impunity (Marshall Hall). Carbon dioxide has so little effect on a torvid marmot that one lived after being four hours in this poisonous gas. Simon and Friedleben noticed that in some hibernators the thymus gland gets laden with fat just nators the frynius giand gets laden with lat just before they retire for the winter, and Barkow has described a portion of this as the 'hibernating gland.' In this special organ, he claims, the fat is transformed into a store of animal starch and sugar, by which the heart and tunseles are fed during the period of topidity. But his observations have not been confirmed, this gland not existing in all hibernators; nor is it at all certain that topid is it us. Moreover context to his extend in an intermediate in the state of the state of the state of the section, hibernators do lose weight, often to the extent of 30 and 40 per cent., in this respect resemhling starving animáls.

Hihernation in other animals has not been so closely studied. All reptiles and batrachia become torpid during cold weather, snakes passing the winter in tangled knots as if for warmth: if the viper is aroused at this season its venom is said to be inert. Alligators ereep into hales in the riverbanks, and frogs lie domant in the mud at the bottom of ponds. Many fishes (carp, roach, clmb, minnows, eels, the Moditerranean murrena, &c.) also refire into some deep recess, or into the mud, though their condition at this period is not that of the true hibernators. Their vitality only is lowered. In winter all land-smalls hibernate by closing the mouths of their shells with a plate of the with a plate of the winter and land-smalls hibernate by (the epiphragm), leaving only a little hole in the middle of it for breathing. Slugs also become torpid in holes in the ground, and the fresh water mussels (Unio, Anodonta, Dreissena) bury themselves in the pond and river mud until the cold mouths are over. The torpidity of insects in the pupa and other stages is well known. Individuals belonging to the Vanessa group of lutterlies which hibeinate in the image stage occasionally emerge during mild winter days. But hive-bees do not hibernate, food being necessary for their subsistence during the flowerless season.

ence during the flowerless season.

See Animal Heat and Prishology; Temperature of the Body; also Barkow's Der Winterschlaf nach scinen Erscheinungen im Thierveich dargestellt (1846); Friedleben's Die Phys. der Thymus Drüse (1856); Simon's Physiological Essay on the Thymus Gland (1845); Lloyd's Field Sports of the North of Europe (1886), pp. 124-125; Marshall Hall in Todd's Cyclopadia of Anatomy and Physiology (vol. ii. p. 771 et seg.); Newport, Philosophical Transactions (1837); Brown's Mammals of Greenland (Admiralty Manual, 1875, p. 16); and Our Earth (1890), vol. iii. pp. 29-30; Duns in Science for All (vol. v. p. 240), &c.

Hibernia. See Ireland. For the Hibernian School, see ROYAL MILITARY ASYLUM.

Hibiscus, a genus of plants of the natural order Malvaceæ, the type of a tribe or sub-order distinguished by a double calyx and fruit of three or more many seeded carpels united into a many-celled capsule. The species are numerous, natives of warm climates, some of them trees or shrinks, but most of them large herbaceous plants, animal or perennial. The flowers of many are very beautiful; in the South Sea Islands they are much used for personal adornment. H. syriacus, sometimes

but erroneously called Althon fruter, a native of Syria and Carniola, has long been in cultivation as an ornamental shrub, and proves sufficiently hardy in many parts of Britain. Many are favourite hothouse plants. The characteristic mucilaginous and fibrous properties of the Malvacen are very strongly developed in this tribe. The finit of H. strongly developed in this since the first and secondarius (or Abelmoschus esculentus) is in general use both in the East and West Indies as an article of food; its name in the West Indies is (tobbo. It is an annual plant, with a soft herbaceous stem, 3 to 5 feet high, crenate leaves, axillary sulphur-coloured flowers, and pyramidal, somewhat podlike capsules. It is cultivated in some parts of the south of Europe.

The

by

fruit is

generally much esteemed,

Tt

into

The

treo

in

high,

used in an un-

but is disliked

some account of its viscidity.

enters, as an

ripe seeds are

sometimes used somewing as in somps as The

bark of H. tiliuccus-a

with a very thick bole—so abounds

uncilage that

by chewing it

the natives of

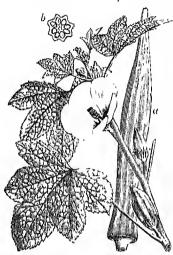
fcct 20

important

grédient, the pepper-pot of the West

Indies.

ripe state.



Hibisous esculentus, upper part of a flowering plant: a, unripe fruit; b, section of do. (Bontley and Trimon.)

the South Sea Islands obtain nonrishment in times of scarcity. This tree is one of the most abundant trees of the South Sen Islands; and the wood, being light, tough, and durable, is much used for many purposes. From its fibre the Tahitians manufac-ture matting fine and coarse, the latter for sleepthe ratio and the total and the same in the ratio and the ratio and the same. The back is very fibrons, and twine of the same. The back is very fibrons, and cordage and matting are made of the libre in various tropical countries. Many other species yield libres, some of them coarse, some of them line and beautiful, which are used in different countries; but the most important in this respect is H. cannabinus, the Decean Hamp of western India (see Fibrous Substances). II. sabdariffa is very generally cultivated in warm countries, on account of its ealyx, which, as the fruit ripens, becomes fleshy, and acquires a very pleasant acidity. It is much used for making tarts and jelly, and a decoction of it, sweetened and fermented, affords a refreshing beverage, well known in the West Indies as Sorret Cool Drink, the plant being called Red Sorrel; and in the Madras territories it is used for incident appropriate the strength of the strength similar purposes, and is named Rozelle or Rouselle. Abelmosthus (or Abelmoschus moschutus), sometimes called Musk Seed, another plant common in widely separated tropical countries, is cultivated for its seeds, which have a fragrance between that of musk and that of amber. They are much used by perfumers, and are called Ambrette or Graines of Ambrette. In Egypt and Arabia they are mixed with aether and etimest and storage and storages. with coffee, and stimulant and stomachic qualities are ascribed to them. The petals of H. Rosa-Sincusis possess astringent properties, and they are also used by the Chinese to stain their eyelnows and their shoes black.

Hiccup, or Hiccouch, is caused by an involuntary contraction of the Diaphragm (q.v.), while the glottis is spasmodically closed. The inward current of air through the narrowed aperture, and its sudden arrest when the glottis closes, cause the characteristic sound. Usually the paroxysm only lasts for a few minutes, but it may common cause of hicen is some disordered condition of the stomach. Very obstinate biccup some times occurs in various diseases, especially fevers and diseases of the lungs and liver; and may be a very serious complication in consequence of the exhaustion it produces. Sometimes it has a nervous

origin.
When the attack is slight it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus kept in a state of voluntary contraction. A draught of cold water, a start or blow, or strong pressure round the waist will sometimes give relief. In more obstinate cases a combination of camphor or of opinm with chloroform, and the frequent swallowing of small rounded pieces of ice, are perhaps the most efficient remedies. Bismuth, nux youica, bromide of potassinn, and many other drugs have also been recommended.

Hickes, George, nonjuror and philologist, was born at Newsham, Yorkshire, June 20, 1642. He studied at Oxford, in 1661 was elected Fellow of Lincoln (College, and in 1666 took holy orders, In 1676 he became chaplain to the Duke of Landerdale, whom he accompanied to Edinburgh, In 1678 he received the degree of D.D. from the In 1678 he received the degree of D.D. from the university of Glasgow, and next year from Oxford. In 1682 he was appointed one of the king's chaplains, and the following year made Dean of Worcester. Refusing at the Revolution to take the oaths to King William III., he was deprived of all his benefices. In 1693 he was sent with a list of the nonjuring clergy to the exiled king at St Germains, and in 1694 was consecrated by a prelate of his own party Suffragan Bishop of Thetford. His publications in controversial and practical divinity are numerous. His greatest work, entitled Thesaurus Grammatico-Criticus et Archaeologicus Linguarum Veterum Septentrionalian, logicus Linguarum Veterum Septentrionalian, appeared at Oxford in 1705, 3 vols. fol., and in 1689 he had published a grammar of Auglo-Saxon and Mass-Gothic. He died December 15, 1715. Meso-Gothic.

Hickory (Carya), a genus of trees formerly included among Walunts (Jughaus). The hickories are exclusively North American. They are large and beautiful trees, attaining a beight of 70 or Roor even 100 feet, with pinnate compound leaves. The timber of all of them is very heavy, strong, and tenacions, but decays speedily when exposed to heat and moisture, and is said to be peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes, and shafts of carriages, handles of axes and golf-clubs, large serews, &c. are made of it. It is greatly esteemed for fuel. The nuts of some of the species are excellent eating, and in flavour resemble walnuts. They are enclosed in husks which split up into four equal valves; the surface of the nut is smooth, with four or mere ridges running lengthwise, and meeting, especially in *C. sulcata*, in sharp points at either end.—*C. alba*, the Shell-bark or Shag-bark Hickory, so called from its shaggy onter bark, which peels off in long narrow plates, yields the common hickory-nut of the northern parts of the United States. The trunk is slender, and the tree occasionally reaches a height of from 80 to 100

feet. Its compound leaves are often 20 inches long. The nuts have a delicious flavour, and are in considerable request. The shell is thin but hard, the kernel sweet.—C. sulcata, the Shell-bark Hickory of the West, is a very similar tree, found from Pennsylvania to Wisconsin.—C. olivaformis, a western and southern species, yields the well-known Pecan Nut—in which the internal partitions common to the other hickonies with the walnut are lacking. It is a handsome tree of 60 or 70 feet high—in some cases reaching 90 feet.—C. tomentosa yields the Mocker Nut, and C. amara the Bitter Nut; while the Pig-nut Hickory, also with a bitter nut, is C. porcina.

Hicks, Ellas, a celebrated American prencher of the Society of Friends, was born at Hempstead, Long Island, March 19, 1748. At the age of twenty-seven he was already a well-known preacher, and for many years he travelled through the States and Canada, receiving no compensation for his labours, and when not preaching labouring on his own farm. He was one of the first in his body to agitate against slavery. An able preacher, he exercised great influence among his co-leigionists until his unitarianism, or denial of the divinity of Christ and a vicarious atonement, brought him into disfavour with orthodox Friends; but he published his own views with perseverance, and at the age of eighty still travelled and preached. The result of his labours was a schism of the society into two divisions, popularly known as Orthodox and Hicksite Friends (see Friends). He died at Jericho, Long Island, February 27, 1830. See his Journal (Phila, 1828) and Letters (1834).

Hidalgo, a word explained as being originally hijo de algo, 'son of something,' is the title of a member of the lowest class of Spanish nobility.

Hide, in old English law, denoted a certain area of land, the exact quantity of which is variously given as 60, 80, and 100 acres. According to R. W. Eyton (Key to Domesday, 1877), the Domesday hide of land denoted fiscal value, not superficial quantity.

Hides. See LEATHER.

Hieracium. See HAWKWEED.

Hierapolis, two ancient eities of the Orient. (1) Hierapolis, or on coins Hieropolis, was a city of Syria Cyrrhestica, and stood on the high-road from Antioch to Mesopotamia, 14 miles W. of the Euphrates. Under the Seleucid kings this city was an important centre of trade, particularly in cotton and silk. The great temple of Astarte (locally known as Bambyke or Mambog) was plundered by Crassus in 53 B.C. With the growth and spread of Christianity, Hierapolis gradually lost its importance. Passing into the hands of the califs, it was refortified by Haronn al-Raschid about the beginning of the 9th century. It was captured by Romanus Diogenes in 1068, and was again stormed by Saladin in 1175. Its decay dates from the time of the Mongol invasion.—(2) Hierapolis was the name given to a city of Phrygia, situated between the rivers Lycus and Meander, 5 unles N. of Laodicea. It was celebrated for its hot springs, and for a cave, called Phrtonium, whence issued mephitic vapours that proved fatal to life. At Hierapolis, the birthplace of Epictetus, Cybele was much worshipped; and there St Paul founded a Christian church. See Harper's Magazine, October 1889.

Hierarchy (Gr. hieros, 'sacred,' and archō, 'I govern'), the name used to designate the whole sacred governing and ministering body in the church, distributed according to its several gradations. See Orders (Holy), Bishop, Priest, Deacon; also Pope.

Hieratic Writing. See HIEROGLYPHICS.

Hiero I., king of Syraense, succeeded his brother Gelon in 478 B.C. The most important event of his reign was the naval victory gained by his fleet and that of the Cumani over the Etruscans in 474, which deprived the latter of their supremacy in the Tyrrhenian Sea. Though violent and rapacious, he was a lover of poetry, and the patron of Simonides, Eschylus, Bacchylides, and Findar. Hiero died at Catana in 467 B.C.

Hiero II., king of Syraense (270-215 B.C.), was the son of a noble Syraensan named Hierocles. During the troubles which prevailed in Sicily after the retreat of Pyrrhns (275 B.C.) Hiero greatly distinguished himself, and was first appointed commander-in-chief and then elected king of the Syraensans. He joined the Carthaginians in besieging Messana, which had surrendered to the Romans; but he was beaten by Appins Claudins, the Roman consul, and compelled to return to Syraense. In 263, however, he concluded a peace with the Romans for fifteen years, during which he proved so faithful to his engagements that in 248 peace was permanently established. In the second Punic war Hiero likewise proved himself the faithful ally of the Romans, and supported them with money and troops, especially after their defeat at the lake of Thrasymene. He died in 215, and was succeeded by his grandson Hieronyums. Hiero, by his clemency, wisdom, and simplicity, quite gained the affections of the Syraeusans, and his financial arrangements were adopted by the Romans when they subsequently conquered Syraeuse. He devoted great attention to the improvement of agriculture, and his laws respecting the tithe of corn, &c. (Leges Hieronicæ) were still in force in the country in Cicero's time. He was likewise a patron of the arts, particularly architecture; and Archimedes was his relative and friend.

Hierocles, the Neoplatonist, lived at Alexandria about the middle of the 5th century, and enjoyed a great reputation. He is usually reckoned the anthor of a commentary on the golden verses of Pythagoras (edited by Mullach, 1853). A collection of jests (Asteiu) used also erroneously to be fathered on him.

Hieroglyphics (literally 'sacred sculptures,' from hieros and glyphō), a term applied to the representations of objects used to express language, especially those which the ancient Egyptians, Mexicans, and other nations employed for that purpose. The term hieroglyphs would, however, be more correctly applied to these figures. The number of those used by the ancient Egyptians was probably about 1700, and by means of them they were enabled to express all their ideas with correctness, clearness, and facility. They consist of represcutations of figures of men and women and their limbs; quadrupeds, birds, fishes, and reptiles; plants, trees, and flowers; eelestial bodies; mountains, islands, stones, water; towns, buildings, rooms and parts of a honse; fighting implements and sceptres; articles of furniture; musical instruments; mathematical figures; crowns and baskets; ships and their various parts, &c. Hieroglyphics were inseribed upon granite, basalt, porphyry, and sandstone; they were ent or painted upon papyri, slabs of calcareous stone, and leather. A reed pen,

The palette used for holding the ink was usually a flat, rectangular piece of wood or ivory measuring about 2½ inches by 12. At one end of this two or more holes were hollowed out for holding link. The colours most commonly used were black, red, and green; the first was made from vegetable, the second and third from mineral substances.

Inscriptions on Egyptian monuments are sometimes inlaid with colours, an attempt being made to imitate the natural colours of the animals and objects, representations of which are employed to form the inscription. The painted inscriptions which are found upon the inner coffins in the tembs of the 18th and 19th dynasty usually follow a conventional design; the number of colours used upon them being comparatively few, six at the most. But on the Ani papyrus in the British Museum as many as thirteen colours are used. On papyri they are usually drawn in outline in black. The rubries and initial words are usually written in red. Hieroglyphics are written in horizontal lines or perpendicular columns, which are separated by lines drawn in black ink, Usually they are to be read in the direction in which they face, and are so arranged as to cover completely all the parts of the papyrus which were to be written on. Egyptian hieroglyphies are read in the order in which they are written; this order is sometimes broken for the sake of symmetrical arrangement.

Hieroglyphics are either phonetic or ideographic; the former class comprises signs which represent sounds, and the latter those which represent ideas. Phonetic signs are either alphabetic or syllabic.

The hieroglyphic alphabet is as follows:

<u>A</u>	a		h
q	Å	1 \$	ļì
	a	8	χ
44, 11	i	∏,	Я
₿, e	u		вh
	p	Δ	ч
	p	\square	ķ
مخ	f		k
A, \subset	= m	Δ	t
~~~	n		Ļ
0	l or r	∫, ==	th
متلك	r or l	1 -	ť

The earliest Egyptian hieroglyphic inscriptions known to us are filled with the alphabetic signs here given; this fact shows that so far back as 3800 n.c. the use of phonetic signs was well known and used. The other phonetic signs have syllabic values. A large number of the bieroglyphics are employed as ideographs, or representations of ideas. Every word in Egyptian has one determinative or more at the end of it. Thus, after the word for tree we have the picture of a tree, ### ; and after the word

for dog we have the picture of a dog, . An alstract idea, such as joy or gladness, was expressed by the figure of a woman heating a tambonrine, or a man dancing, or by the figure of some object possessing it, as . , a jackal, to express the idea of ennuing or eraft; . , a seated man, signifying man, was applied to all relationships, functions, and offices of men, as att, 'father;' sen, 'brother;' men, 'governor;' hen, 'priest;' bak, 'labourer:' the special meaning which it conveyed being shown by the phonetic groups which preceded it. In the same way all beasts, or ebjects made of leather, were

expressed by a skin, ; all precions stones or objects made of the same, by o; all actions of moving, standing, or stretching, by two legs, \(\Lambda \); and all actions in which the idea of strength was to be conveyed, by an arm and a stick, \(\Lambda \). The number of these signs may be computed at about 150, and they resemble in their use those of the Assyrian emeiform, in which, although to a more limited extent, the leading classes of thought were determined by a character prefixed or affixed to the phonetic group giving the particular idea. Thus, in the Assyrian, all names of men are preceded by a single upright wedge, \(\); all countries by \(\Lambda \); names of horned cattle by \(\Lambda \); and after the names of certain places, Babylon, for example, \(\Lambda \) is affixed. In the Egyptian system, however, the determinatives are always placed after the phonetic groups, and are more numerous. The Chinese system of writing approaches still more closely to the Egyptian, 242 radicals, as they are called, but really determinatives, being placed after other groups and symbols, which indicate the special idea intended. In this last language the radicals are generally placed to the left, except in those instances in which they enclose the phonetic or special groups. In the Egyptian hieroglyphs every word not expressing an abstract idea, such as the very 'to be,' or the grammatical forms and pronouns, is accompanied by its determinative, and is incomplete without it. The following examples will illustrate the use of determinatives in Egyptian:

		-
	sesli,	a bird's nest.
BI De Ser	nàa,	a boat.
SIL	hebs,	clothes.
	åneb,	wall.
	ket,	little.
6位1100	teblpī,	to pray.
	нехнах,	to run away.
	nelies,	te awake.

SPECIMENS OF ALPHABETIC AND SYLLABIC HIERO GLYPHIC CHARACTERS.*

_		1 11	
	an eagle, A.	7	leg of astool, Âḥâ
	an arm, Â.	<u></u>	a house, H.
4	a reed, Å.	0	a sieve, x.
X .	a calf, Uä.		a garment, Ūa.
3	a heron, Ba.	220	a lion, R er L.
	a leg, B.	0	a mouth, L or R.
عد	a ecrastes, F.	1	a pen, M.
K	a wild fowl, Ta.	§	a weight, Må.
L	a vase, Ťa.	=	a hole, M.
7	a viper, T.	A	an owl, M.
			4 1 77 100

* The first fount of hieroglyphic type was cut in Engla from drawings by the late Mr Bononu. For the hieroglyphi used in this article we are indebted to Messrs Harrison, printe London.

_	
a vulture, Mut.	a mormyrus fish,
~~ a water-line, N.	a macc, xa.
a red crown, N.	Δ a stand, χer.
℧ a vase, Nu.	top of quiver, Sa.
a goose flying, Pa.	a goase, Se.
□ a door, P.	a woof, Sa.
⊿ a knee, Q.	a reed, Su.
\bigg\ \ \langle a papyrns plant, \\ \text{Ha.}	a hult, S.
fore-part of lion,	back of chair, S.
twisted cord, H.	[1]1 a garden, Sha.
a tosk, Hn.	a pool, SH.
a finger, Teb.) a spindle, θ .
two reeds, I.	a hand, T.
W (two oblique strokes, I.	\Longrightarrow tongs, θ .
a bowl, K.	🛆 a cake, T.
😝 part of dress, χa.	🖟 a chicken, U.
leaf of water-lily, χα.	@ a twisted cord, U.

Under the rule of the Ptolemies in Egypt the values of the hieroglyphs were systematically changed. Thus ξ —, χcn , became m; Λ , ncs, became n, and so on. The various forms of the same vowel were confused with one another, and many changes between consonants took place.

many changes between consonants took place.

The language of the hieroglyphs is most nearly represented by Coptic. Coptic is a name given to the Egyptian language written with the letters of the Greek alphabet, and a few signs borrowed from the demotic forms of some of the hieroglyphs. The Bible was translated into Coptic carly in the 3d century A.D., and the greater part of this work, indispensable for the proper study of the hieroglyphs, has come down to our time. Coptic literature is chicily theological, and the texts are full of Greek words. The forms of Egyptian words as given in the hieroglyphs are often considerably modified in Coptic; many of the changes are caused by phonetic decay. The Coptic language ceased to be spoken about a century ago. See

In Egyptian the noun has two genders, masculine and feminine: feminine nouns usually end in Plural nouns end in u or iu, and are generally followed by ||| or |. In Egyptian nouns have no declensions, and the cases are expressed by particles placed before nouns. Adjectives have no grammatical forms to indicate degrees of comparison. The following are the principal Egyptian numerals:

<u> </u>	นลิ	1	11133	ţūa	5
,,,,,, II	sen	2	111111	suu	6
(a)	χemt	3	J [≈] © IIIIII	sexef	7
Æ 😅	fțu	4	1111	χemenn	u 8

III III pant III	9	ξ χa	1000
III ∩ meti	10) țeb	10,000
∩∩ 'taut	20	🥦 ḥefn	u 100,000
ՈՈՈ māb	30	j þeþ	1,000,000
e shaā	100	Q sher	10,000,000

The personal pronons are: nuk or anuk, 'I;' entuk (masc.), entut (fem.), 'thou;' entuf, 'he,' entus, 'she;' entuten, 'you' (plur.); entusen, entu, 'they.' The personal suffixes are a, 'I,' k, 'thon' (masc.), t, 'thou' (fem.); f, 'he,' s, 'she; 'n, 'we;' ten, 'you;' sen, set, 'they.' The Egyptian verb bas no tenses, moods, voices, conjugations, or personal endings. The exact meaning of a verb or personal endings. The exact meaning of a veri-must be gathered from the context or the syntax of the sentence. The Egyptian verb is often accompanied by one of the following auxiliary verbs: $\dot{a}u$, 'be;' un, 'be,' 'to arise;' $\dot{a}ri$, 'do;' $\ddot{a}h\ddot{a}$, 'stand;' $t\ddot{a}$, 'give.' Considered as one of the most ancient written

languages, Egyptian throws great light upon comparative philology, the relative antiquity of various words and locations, the general construction of language itself, and the development of picture-writing into the abstract ciphers of sound, called letters. During the 19th dynasty, or about 1400 B.C., many Senitic words were introduced into the language by the success of the Egyptian arms in the East, and such words as bata for Beth, 'a house,' makaturn for Migdol, 'a tower,' and others, appear: they are, however, rare and few in number compared to the hody of the language.

The invention of hieroglyphs, called Neter kharn, or 'divine words,' was attributed to the god Thoth, the seribe of the gods, and lord of the hieroglyphs. Pliny attributes their invention to Menon. The Hermate of the Egyptians was in fact styled Hermate or Hermetic, on account of its supposed divine origin, and the knowledge of hieroglyphs was, to a certain extent, a mystery to the ignorant, although universally employed by the sacerdotal and instructed classes. To foreign nations the hiero-glyphs always remained a mystery, although Moses gry pins arrays remained a injectry, arthogh aroses is supposed to have been versel in the knowledge of them (Plilo, Vita Mojsis). The Greeks, who had settled on the coast as early as the 6th century B.C., appear not to have possessed more than a colloquial broundary of the largement and although. Salar knowledge of the language; and although Solon, 538 n.c., is said to have studied Egyptian doctrines at Sebennytus and Heliopolis, and the doctrines of Pythagoras are thought to have been derived from Egypt, these sages could only have acquired their knowledge from interpretations of hieroglyphic writings. Hecatrens (521 B.C.) and Herodotus (456 R.C.), who visited Egypt in their travels, obtained from similar sources the information they have afforded of the language or monuments of the country. Democritus of Abdera, indeed, about the same period (459 n.c.), described both the Ethiopian hieroglyphs and the Babylonian cuneiform, but his work has disappeared. After the conquest of Egypt by Alexander, the Greek rulers that the conquest of the confidence of the language and history hegan to pay attention to the language and history hegan to pay attention to the language and instory of their subjects; and Eratosthenes, the keeper of the museum at Alexandria, and Manetho, the high-priest of Sebennytus, drew up accounts of the national chronology and history from hieroglyphic sources. Under the Roman empire, in the reign of Augustus, one Charcanon, the keeper of the library to the Sampanum, compiled a dictionary of the at the Serapeum, compiled a dictionary of the hieroglyphs; and both Diodorus and Strabo mention them, and describe their nature. Tacitus, later under the empire, gives the account of the monuments of Thebes translated by the Egyptian

priests to Germanicus; but after his time the knowledge of them beyond Egypt itself was execcdingly limited, and does not reappear till the third and subsequent centuries A.D., when they are mentioned by Annianus Marcellinus, who notes the translation of one of the obelisks at Rome by one Hermapion, and by Julius Vulerius, the translator into Latin of the apoeryphal life of Alexander, who gives that of another. Heliodorns, a novelist who flourished 400 A.D., describes (iv. 8) a hieraglyphic letter written by Queen Candace. The first positive information on the subject is by Clement of Alexandria (211 A.D.), who mentions the symbolical and phonetic, or, as he calls it, cyriologic nature of hieroglyphics. Porphyry (304 A.D.) divides them also into econologic or phonetic and enigmatic or symbolic. Horapollo or Horus-Apollon, who is supposed to have flourished about and enigmatic or symbolic. 500 A.D., wrote two books explanatory of the hieroglyphs, a rude, ill-assorted confusion of truth hieroglyphs, a rude, ill-assorted confusion of truth and liction, in which are given the interpretation of many hieroglyphs and their esoteric meaning. After this writer all knowledge of them disappeared till the revival of letters. At the beginning of the 17th century these symbols first attracted attention, and about 1050 Athanasius Kircher, a learned Jesuit, pretended to interpret them by vague esotoric notions derived from his own fancy, on the supposition that the hieroglyphs were ideagraphic—a theory which barred all progress, and which was held in its full extent by the learned, till Zoega in 1787 first enunciated the proposition that the ovals or eartonches contained royal names, that the ovals or cartonches contained royal names, and that the hieroglyphs, or some of them, were used to express sounds. More monuments were known, and more correct ideas had begin to dawn on the European mind; and the discovery by the French, in 1799, of the Rosetta Stone, a slah of black basalt, having inscribed upon it, first in hieroglyphics, secondly in demotic or enchorial (a cursive popular form of writing extant at the period), and thirdly in Greek, a decree of the priests of Egypt assembled in synod at Momphis, in honour of Ptolemy V., gave V., gave The lirst the first cine to the decipherment. attempts were made upon the demotic text by Silvestre de Sacy with some success, but it was soon discovered that the denotic was not purely alphabetic. Crude notions of the ideographic nature of the hieroglyphs prevailed till Dr Young, in 1818, list gave out the hypothesis that the hierographic purely in the process of th glyphs were used as sounds in royal proper names. He was led to this conclusion by trueing the hieraglyphs through the enrsive hieratic to the more cursive demotic; and, as this last was known to be alphabetic, he inferred that the corresponding hieraglyphic signs were also alphabetic. In this manner he came to the conclusion that the first hicroglyph

in the name of Ptolemy (R & M) in the

Rosetta Stone (a door) represented a P, the second (hemisphere) a T; the third (a loop) he supposed to be superfluous; the fourth (a lion) he read OLE; the fifth and sixth, the syllable MI; and seventh, the back of a seat, an S. Unaided by bilingual monuments, he essayed to decipher the name of Boronice, and altogether established the value of five hieroglyphs as letters out of two names, but was mable to proceed further. Champollion (q.v.), in 1822, by means of an inscription found on an obolisk at Phile, which had at the hase a Greek inscription, recognised the name of Cleopatra, and by comparison with that of Ptolemy, at once proved the purely alphabetic, not syllabico-alphabetie nature of the signs. Extending the principle, he read by its means the names of the Greek and Roman, and finally those of the native monarchs.

It was soon seen that the same hieroglyphs as those employed in these names were extensively used in the texts for words, and these words turned out in most instances to be analogous to the Coptic, Although the discoveries of Champollion were received by many of the learned in Europe with received by many of the learned in Enrope with distrust, yet his method of research was slowly adopted by Rosellini and Salvolini in 1832, and subsequently extended methodically by Lepsins in 1837, and by Bunsen, Hineks, De Rougé, Birch, Goodwin, Chabas, Brugsch, and others.

The method of interpretation adopted has been strictly inductive, the value of the characters being belowed from the aquation of sounds or lower.

deduced from the equation of sounds, or homophones of similar gramps. The meaning of the gramps or words has been determined by examining all known instances in which they occur in passages capable of being interpreted, that of the ideographs by observing the form of the symbols; many of them have been made out from the picture. tures which they explain, or the phonetic groups which accompany them. A careful comparison has been instituted with corresponding Coptic forms when they exist. In short, a careful principle of induction has been applied to the study of the

hieroglyphs.

The discovery of another trilingual inscription. that of the tablet at San or Tanis, recording a synadical act of the priests in the reign of Ptolemy Shorestes II., 238 B.C., has confirmed the results obtained by Egyptologists, the meaning of almost all the words having been previously determined; while the power of reading all documents and inwhile the power of reading all documents and inscriptions afforded by their researches has resulted in the resuscitation of a knowledge of the history, science, and literature of the ancient Egyptians. The study has long passed into the eategory of a recognised branch of oriental learning, and the researches have assumed a more critical form. This has been owing to the number of students and the abundance of the material which exists. The doubts with which the interpretations were at first received have succumbed to the conviction first received have succumbed to the conviction that nothing but a logical system of interpretation could have obtained such results. Whatever doubt, in fact, may exist as to the minor details and more deliente shades of lunguage, all the grammatical forms and three-fourths of the words of the old Egyptian language have been established.

The hieroglyphs stood in the same relation to the other two forms of the characters, called binomic and department in the other two forms of the characters, called

hieratic and demotic, as type does to handwriting. Their use was chiefly for official inscriptions on public or private monuments, religious formule and prayers, and rituals or Hermetic Books (q.v.). must remarkable hieroglyphic inscriptions are the texts found inscribed mon the pyramids of Popi, Teta, and Unas; that of Una, recording the conquest of the hands of the negroes at the time of the 6th dynasty; that in honour of Klimumheth at Benihassan, recording the investigation of the neglection of the gold collections. ture of his family with the order of the gold collar; the enunrigus of Almes against the Hykshos at El-Kab; the annals of Thothmes III. at Karnak; the enunrigu of Rameses II. against the Khita, and the treaty with them; the account of the tanks for gold-washings in the reigns of Seti I, and Rumeses II, at Konban and Redesich; the invasion of Egypt in the reign of Meneptah by the allied forces of the Libyuns and other people of the hasin of the Mediterranean; the star-risings on the tomb of Rameses V.; the journey of the ark of Khons to Bakhtan, in the reign of Rameses X.; the account of Cambyses and Darius on the statue of the Vatican; the already-cited synodical act of the priests in honour of Ptolemy Energetes II.; and that of the priests assembled at Memphis, on the Rosetta Stone, in the reign of Ptolemy V.; the scpulchral tablets of the family of Pasherenptah, and the long series of sepulchral tablets of the bull Apis found in the Serapeion, recording the birth, installation, and death of the bulls from the

18th dynasty to the Persians.

In connection with the hieroglyphics are two forms of writing them in common use, first the hieratic writing, or a cursive form of hieroglyphic. The number of these written characters is fewer than that of the hieroglyphs, the generic determinatives being more employed, and the vocalic compleusents of the consonants heing constantly written in order to distinguish similar forms. This writing was more extensively used than the hicroglyphic, being employed for state papers, legal documents, memoranda, accounts, religious books, rituals, and all the purposes of private and public life. Books were generally written in liberatic. It commences as early as the 4th or 5th dynasty, and terminates only about the 3d or 4th century of our era. At the earliest period it is occasionally written perpendicularly, but it was afterwards only written horizontally, and has generally portions in red ink, correspond-ing to our initial illuminated letters or rubics. Many scholars hold it proved that the hieratic alphabet gave rise to the Phenician, and have traced the Phenician alphabet from hieratic sources (as in our article ALPHABET, Vol. I., where on page 187 the hieroglyphs, the hieratic characters, and the Phenician alphabet will be seen side by side). Others still affirm that the precise source of Phomician writing remains involved in obsenrity. The second kind of hieroglyphic handwriting was the demotic. It is, like all cursive hands, more difficult to decipher than the literatic. It was used as far back as the commencement of the 26th dynasty, or It was used as far the 6th century B.C., and continued in use till the 3d century A.D. This was the last native form of writing in Egypt, the early Christians having introduced the Greek alphabet, with a few characters borrowed from the demotic. This script is rarely used for public monuments, although it appears on the Rosetta Stone; but it was universally employed for contracts, public documents, and occasionally for religious formulæ, owing to the decreasing knowledge of hieroglyphics. At the time of Clement it was the first learned by beginners. With it the Greek language began to appear in public use.

Besides the Egyptian hieroglyphics there are those of the Aztees or Mexican, which were developed to a stage far above the rude picture-writing of the hunting tribes of American Indians. The system was mainly pictorial, but had made important advances toward attaining phonetic value, especially in the picture-names of persons and places. The simplest kind is where a name meaning 'bird-mountain' is represented by a bird and a mountain; another stage is where a personal name of five syllables is represented by five pictures, each representing a thing whose name corresponds to one syllable of the person's name. After the Spanish conquest, the Franciscans used the Mexican symbols for teaching Christianity. Thus

in the Lord's Prayer in Latin, , a flag, pronounced Pantti, was used for the syllable Pa; , a stone, Tetl for të, the two expressing Pater; , a caetns fruit, Nochtli, for Noch: and a stone, , as above for te: these four groups expressing Pate(r) Nochte, or Noster; and so forth. Some of the missionaries complained of their difficulties when overwhelmed by converted Mexicans giving their confessions written in this puzzling manner. Some have absurdly affirmed, indeed, that all the Mexican manuscripts are monkish impostures. The most important—religious, administrative, his-

torical—are on parchment or on maguey paper. The Toltecan symbols of Central America were different in their method from those of Mexico.—The term hieroglyphic was also used by the writers of emblemata or devices, symbolising Gnomic sentences taken from the Greek and Latin poets, and having no relation to Egyptian hieroglyphs.—In recent times, too, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs.

they called hieroglyphs.

Zuega, De Origine Obeliscorum (fo. Rome, 1797);
Young, Archaologia (1817, vol. xvii. p. 60); Encyclop.
Britanica (8th ed.); Champollion, Precis du Système
Hicroglyphique (1824), Grammarre Egyptienne (184161), Dictionnaire (1841); Lepsius, in the Ann. del'
Instituto Arch. (1828); Birch, Introduction to the Study
of the Hicroglyphics (1857); Briggel, Grammare Dimotique (Berlin, 1855), Woltrbuch (1867-68), Grammatik
(1872); De Rougé, Etude d'une Stèle Egyptienne (1858);
Chabas, Papprus Magique d'Harris (1851); Zeitschrift
f. agypt, Spruche (1863-74); Bunsen, Egypt's Pluce
(vol. v. 1867). For a tolerably complete list of the
principal works relating to hicroglyphic literature, see
Brahim Hilmy, Bibliography of Egypt and the Soudan
(2 vols. Lond. 1886-87).—For American picture-writing
and Mexican hieroglyphics, see Schoolcraft's works;
Kingsborough, Mexican Antiquities (1831-48); E. B.
Tylor, Anahmac (1861); Im Thurn, Among the Indians
of Guiana (1883). See also the articles Alphabet,
China, Egypt, Writing.

Hieronymites, one of the many hermit orders established in the course of the 13th and 14th centuries. The Hieronymites grew out of the Tertiales or third order of Franciscans (q.v.). Some of the followers of Thomas of Sienna, one of the Franciscan rigorists, having established themselves in various places among the wild districts which skirt the Sierra Morena in Spain, by degrees formed into a community, and obtained in 1374 the approval of Pope Gregory XI., who continued their rule, which was founded on that of St Angustine. The institute extended into other provinces of Spain, into Portugal, later into Italy, Tyrol, and Bavaria.

Hieronymus. See JEROME.

Hierophant, the priest who presided over the mysteries at Eleusis. See MYSTERIES.

Hierosolyma. Sec JERUSALEM.

Higden, or Higdon, Ralph, author of the Polychronicon, a general chronicle, in 7 books, detailing events from the beginning of the world to the death of Edward III. Higden's own share in the work is believed to extend down to 1326 or 1327 only, the rest having been written by two continuators. Higden himself was a monk of St Werbuigh's monastery in Chester; he is said to have lived there sixty-four years, and died probably in 1363. An English translation of the Polychronicon by John Trevisa was printed by Caxton in 1482. This and another early translation, with the text, have been edited for the Rolls series (9 vols, 1865-86) by C. Babington (vols, i. ii.) and Professor Lumby (vols, iii.-ix.).

Higgins, Matthew James, English essayist, better known by his principal nom de plume of Jacob Omnium, was born at Benewn, County Meath, Ireland, on 4th December 1810; was educated at Eton and New College, Oxford; and died at Ringston House, near Abingdon, on 14th August 1868. His intellectual force, his humonr and irony were enlisted in the warfare against the abuses and backslidings and minor evils of social and public life, such as the heaping up of legal costs as sung by Thackeray. He wrote no great book, but was a steady contributor to a series of journals, such as the New Monthly Magazine, Morning Chronicle, Times, Cornhill, Edinburgh Review, Pall Mall Gazette, &c. He particu-

larly 'excelled in the implication of the most pungent meaning in a dennire simplicity of state-mont. He was a man of gigantic stature—6 feet 8 inches high. A few of his sketches were collected by their author, and printed for private circulation in 1837. They appeared again, with others, as Essays on Social Subjects, with a Memoir by Sir W. Stirling Maxwell (1875).

Higginson, Thomas Wentworth, an American author, was born at Cambridge, Massachusetts, 22d December 1823, graduated at Harvard in 1841 and at the divinity school in 1847, and was ordained in the same yeur. He retired from the ministry in in the same year. He retired from the ministry in 1858. Meanwhile he had been active in the anti-slavery agitation, and, with Theodore Parker, Wendell Phillips, and others, had been indicted for the murder of a man killed during an attempt to rescue a fugitive slave, but escaped through a flaw in the indictment. In the struggle to make Kansas a free state he took a conspicuous part. In the civil war he rose to the command of the first regiment that was raised from among the former slaves. He afterwards returned to literature, and slaves. He afterwards returned to literature, and in 1880-81 was a member of the Massachusetts legislature. His books include, besides histories of the United States, a volume of Harmord Memorial Biographies, and a translation of Epictetus, Out-door Papers (1863); Malbone, an Oldport Romance (1869), and Oldport Days (1873); Army Life in a Black Regiment (1870); Attentic Essays (1871); Common-Sense about Woman (1881); a Life of Margaret Fuller (1884); The Monarch of Dreams (1886); and Hints on Writing and Speechmaking (1887). making (1887).

High Commission Court, a court or judicial committee established in 1559 by Queen Elizabeth to investigate occlesiastical cases, the members being nominated by the crown. In the reign of James I. disputes arose between the common law courts and the High Commission as to the powers of the latter. In 1611 Coke decided that it had no right to fine or imprison, save in cases of heresy and schism. Land employed it freely to enforce uniformity and prevent immorality; but the number of clergy prevent immorality; but the number of clergy punished by it was never great. In two years of its greatest activity only three were deprived and seven suspended. Complaints were made against this extraordinary tribunal, the counterpart for occlesiastical persons to the Star Chamber for lay oftenders, that it exceeded its powers, and was in itself illegal; and it was abolished by the Long Parliament in 1641. A new court of commission for ecclesiastical cases was established by James II. in 1686, only to be abolished by the Bill of Rights (1689). The Courts of High Commission established (1689). The Courts of High Commission estatilished by James I, in Seetland in 1608 were abolished in 1638.

Highgate, a northern suburb of London, in the county of Middlesex, 44 miles NNW. of King's Cross Station by rail. The country around has been largely built over with villas. Here Bacon and Right but over with virus. Here bacon and Coloridge died; Whittington's Stone at the foot of Highgute fill marks the spot where Dick heard Bow Bells, and turned again; Coloridge's remains, buried in the old churchyard, are now covered by in the chapel of the Highgate grammar-school; and in the great cemetery (conscernted 1839) have been buried Faraday, Lord Lyndhurst, 'George Eliot,' and many other famous persons.

Highlands, a term applied to the higher parts of a country, as, for example, Highlands of the Hudson, in the state of New York; but commonly used of a particular district in Scotland. This district has no political or civil boundary. Separated by only a vague line of demarcation from the division called the Lowlands, the Scottish Highlands may be briefly described as that portion of

the north and north-west of Seutland in which the Celtic language and manners have less or more lingered until modern times. The Highland line, as it is usually called, extends diagonally across the country from Naim on the Moray Firth to Dumbarton on the Clyde; but the mountainous part of the committees of Bauff, Moray, Abordeen, Kincardine, and Perth are also understood to be included in the designation Highlands. Cattliness might be excluded as being a generally level country; but throughout the Highlands there are stall lead treats were being a pure and there are country; but throughout the Ingineaus there are rich level tracts, none being more so than the custom division of Ross-shire. The Helvides (q.v.) or Western Isles are included in the Highlands, but the isles of Orkney and Shetland, though to the north, are distinctly excluded, by reason of the Norwegian origin of the inhabitants.

The Highlands are full of lofty hills, some green and pastoral with tracts of heath, and others rugged and bare; seven reach a height of 4000 feet rugged and bare; seven reach a height of 4000 feet and upwards, and nearly fifty are between 3500 and 4000 feet. Besides the grander features, there are impetations monutain-torrents, picturesque ravines, and valleys or glens, lakes of singular beauty, and flords, or narrow arms of the sea (like the lakes, called lochs). Perhaps the most remarkable feature in the country is the line of valleys from Inverness to Fort-William, in which lies a series of navigable lochs, united by artificial channels to form the Caledonian Canal. Growing in under a system of clanship, the state Growing up under a system of clanship, the state of society in the Highlands was antiquated and ulien, from a national point of view; while the country was almost impenetrable to travellers or to any species of trallic. The first great attempt to reform this state of allairs was the opening up of the country by roads in different directions, under the superintendence of General Wade, about 1725-26. The next great act of melioration was the abolition of Heritable Jurisdictions (q.v.), including the ancient privileges of the heads of claus, about 1748. And lastly, not to speak of the planting of schools and churches, much was done by the establishment of the Highland and Agricultural Society in 1784. Since these events the ancient patriarchal system has given place to improvements as regards communication, agriculture, dwellings, education, and other modern conditions, including a gradual substitution of English for the Caelic language. Great numbers of the Celtic inhabitants emigrated in the last quarter of the 18th century. An enormous increase of population had arisen with no corresponding inwaste; the discovery that sheep throve ment those natural pastures led of necessity to the letting of them. to such tenants as could supply stock. The half-starving people were at various times dispossessed, and their place taken by stock farmers with capital from the Lowlands; the 'Sutherland clearances,' which have been the subject of so much controversy, took place between 1810 and 1820. While a new character was thus given to extensive Highland pasturages, the value of estates has been very remarkably advanced by being let for the pursuit of game to sportsmen, chiefly persons of rank and opplence from England. What, therefore, with improved farming and shoetings, Highland estates have in the 19th century risen immensely in value. Inverness is usually spoken of as the capital of the Highlands.

The physical geography of the Highlands is discussed under Gueat Britain; see also Scotland. The clan system is treated at Clan, and the language of the Highlands at Gaelic; see also Celes. The condition of the Chopters and the measures taken for aneliorating it form the subject of a separate article; and Deen-forests are treated under that head. See also Agriculture, for

the Highland and Agricultural Society; HEBHDES and articles on the several Highland counties and islands; A. Geikie's Scenery of Scotland (2d ed. 1887); Dr James Browne's History of the Highlands and the Highland Clans (4 vols. 1838; re-edited by J. S. Keltie, 2 vols. 1875); the guide-books by Anderson, Black, Baddeley, Murray; the Duke of Argyll's Scotland as it was and as it is (1887).

HIGHLAND COSTUME.—There is little doubt about the antiquity of the 'garb of old Gaul,' although several writers have adopted the theory that the kilt was introduced by an Englishman early in the 18th century. The idea that the kilt is modern seems to have originated with a writer in the Scots Magazine in 1798. The original dress of the Highlander was the Celtie Feile-breacan (or belted plaid). This was a piece of tartan cloth, 2 yards broad and 4 long, which was drawn round the waist in nicely adjusted folds, and tightly buckled with a belt. The lower part came down to the knees in much the same manner as the modern kilt, while the upper part was drawn up and adjusted to the left shoulder, so that the right arm might be perfectly free. This upper part was the plaid, which was used as a covering for the shoulders, and body in wet weather; and when the use of both arms was required it was fastened across the breast with a brooch, often curiously enriched. A brooch was also used to fasten the plaid on the left shoulder. To attire himself in the belted plaid required on the part of the Highlander no small amount of dexterity. The usual way was to lay it on the floor, and after carefully arranging the folds, to lie down upon it, and then buckle it on. The late J. F. Campbell of Islay, who had a kilt and plaid in one made for a fancy-ball at Buckingham Palace, had to adopt this plan—lying down on the outstretched cloth, gathering the folds up and round his waist, and then securing them in position by a belt. The lower end was fastened at the right hip. The same arrangement may be seen in a figure by George Jameson of the Earl of Moray engraved in Lord Archibald Campbell's Records of Argyll.

The ntility of such a dress in the Highlands is obvious, for the plaid rendered the man indifferent to storms, and prepared to pass a night in the open

obvious, for the plaid rendered the man indifferent to storms, and prepared to pass a night in the open air in the most inclement weather, while the loose undergarment enabled him to wade rivers or ascend mountains with equal case. It was thus peculiarly adapted to the warrior, the hunter, and the shepherd. If benighted, the Highlander of old would dip his plaid in water, and then wrap it round him, the woollen cloth swollen with moisture being supposed to resist the wind, while the exhalations from the body during sleep surrounded him with a warm vapour. Heron's History of Scotland says that 'in Argyle and the Hebridge, before the middle of the fifteenth century, tartan was manufactured of one or two colours for the poor; more varied for the rich.' The author of Certagne Matters concerning Scotland, who wrote prior to 1597, said of the Highlanders that 'they delight in marbled cloths especially that have long stripes of sundrie colours; they love chiefly purple and blue.' The particular setts, or patterns of tartans which distinguish each clan, must have been fixed before 1645, probably before 1600. Martin says that every tribe and every island differed from the rest in the fancy of making plaids, as to the stripes in breadth and colours. Tartans may generally be divided into green and red according as these colours predominate. The word is held by Skeat to be derived from the Fr. thretaine, a kind of linsey-woolsey cloth. Lord Lorne in 1889 discovered at Inveraray old records of the clan Campbell which make frequent mention of tartans; and tartans worn at the battle

of Kilsyth (1645) have been seen by living witnesses.

The Feile-bracan is now abandoned for the Feile-brag (philabeg or filibeg) as more convenient. The difference is simply this, that, whereas formerly the lower and upper parts of the dress were attached, they are now separated. The lower part has the folds fixed by sewing, and is known as the kilt, which is probably akin to the Danish kilte, 'to tuck np,' though the Gaelic realt means apparel in general. The shoulder-plaid, however, is now worn more for ornament than use.

The original garb of the Highlanders, then, was the Feile-breacan, and both in its materials and arrangement it was peculiarly the invention of the Gael. Other articles of the costume were Celtic, and are now peculiar to Scotland, but were not distinctively Highland. The truis or 'trews' were worn by gentlemen when on horseback, and occasionally by others, especially old men. They were sionally by others, especially old men. They were breeches and stockings in one piece, always of tartan, and made to fit very close to the limbs. General Stewart (1822) said that his grandfather always wore the trews on horseback, and the kilt at home. Then there was worn a waistcoat and short-coat, each adorned with silver buttons, and, in the case of gentlemen, with lace and embroidery. A large purse of goats or badgers' skin was suspended from the belt, and answered the purpose of a pocket. This was the sporran, usually ornamented with silver or brass work and tassels. Brogues and tartan stockings, fastened with broad garters in rich colours; a dirk, with a with knife and fork, and sometimes a spoon, stuck in the side of the sheath, and a pair of pistols completed the attire. That of the common people differed only in the deficiency of colours and of silver ornaments. The Highland garb was proscribed in 1747, when it was enacted that any person who should wear the plaid, filibeg, trews, or shoulder-helts, tartans or parti-coloured stuffs, the should be investigated in most the first tartans. should be imprisoned six months for the first offence, and on second conviction be transported for seven years. This harsh law was repealed in 1782 at the instance of the Duke of Montrose. In this act occurs the first formal record of the 'kilt.'

Gentlemen, says Stewart, wore one or more feathers in the bonnet, and the common people a tuft of heather, pine, holly, or oak. All, however, had the right to a solitary eagle's phune, whereas only the son of a chief could wear two plames, and a chief of a clan, three. This was the old clan

The plumed bonnet of the Highland regiments, according to Lord Archibald Campbell, who headed the successful opposition to its proposed abolition (1884), is an adaptation from the knights of medieval Enrope. On the island of Inishail, Loch Awe, there is on a tombstone (of 16th century) a figure, with long sweeping ostrich plumes such as those worn by German knights in Direr's drawings. Similar plumes were also worn by the Earl of Moray in Charles II.'s time, and there are also examples of it in The Black Book of Taymouth. Logan says that the Highland soldiers wore short plumes at the side of the bonnet. The head-dress of the first Highland infantry regiment raised was a simple black cap, with a taft of feathers added in token of gentility and the right to bear arms. From this the feather-bonnet seems to have gradually developed, and is now one of the most eherished distinctions of the Highland regiments. When in 1884 the War Office proposed to abolish it there was quite a storm of indignation aroused, and testimony was produced in abundance that as a military headgear it is light, cool, durable, more serviceable, more economical, and more picturesque than the 'bearskin' of the Guards.

The 'modern' fashion of the kilt (filibeg) is found in armorial bearings of the Burnetts of Leys (1626) and the Mackenzies of Cool (1693). Tartan, as a distinguishing clan-mark, seems to be a survival of totomism. It was so composed that a man could tell to what district, as well as to what clan, the wearer belonged.

Soo Sketches of the Character, Manners, and Present State of the Highlanders, by Major-general David Stewart. State of the Highlanders, by Major-general David Stewart. For details of the costume, &c. of the Highlanders, see The Scotlish (tack, by James Logan; Campbell of Islay's Tales of the West Highlands; The Highlanders of Scotland, by W. F. Skone; History of the Highlands, Highland Clans, &c., edited by J. S. Keltie; The Black Book of Taymouth; Clan Turtans, by James Grant (1886), &c. In The Records of Aryyll and Waifs and Strays of Celtic Tradition Lord Archibald Campbell has collected an immense amount of interesting and valuable information immense amount of interesting and valuable information bearing upon the whole subject.

HIGHLAND REGIMENTS.—The origin of the first of these regiments, the 42d, has been given under the head BLACK WATCH. The valuable services of this regiment encouraged the government to augment the force; and accordingly seven other augment the force; and accordingly seven other Highland regiments were soon raised—viz. the 71st in 1777; the 72d, or Duke of Albany's Own, in the same year; the 74th in 1787; the 78th, or Ross-shire Buffs, in 1793; the 79th, or Cameron Highlanders, in 1805; the 92d, or Gordon Highlanders, in 1800. In connection with the territorial reorganisation of regiments, the old numer torial reorganisation of regiments, the old numertorial reorganisation of regiments, the old numerical designations have been dropped, and the battalions linked. Thus the new Black Watel (Royal Highlanders) comprises the former 42d and 73d regiments; the Highland Light Infantry, 71st and 74th; the Seaforth Highlanders, 72d and 78th; the Gordon Highlanders, 75th and 92d; Princess Lonise's (Argyl and Sutherland Highlanders), 91st and 93d. The Queen's Own Cameron Highlanders (79th) remain a single buttalion regiment. The uniform is the Highland dress, with feather-honnet. A large proportion of the officers are Scotch; of the men about 79 per cent. are Scotch, 11 English, and 10 Irish.

Highness, a title of honour given to princes, Highness, a title of honeur given to princes, grand-dukes, and minor reigning potentates. The title 'Highness' and sometimes 'Kingly Highness' were both used in England for the sovereign until the reign of Henry VIII., when they were superseded by 'Majesty.' The children of emperors are usually addressed as 'Your Imperial Highness,' of kings as 'Your Royal Highness,' whilst members of princely families have the titles of 'Serene Highness' and 'Highness.'

High-priest, the chief of the Jewish priest-hood, the dignity being hereditary in the line of Eleazar, the son of Aaron. The high-priest was only allowed to marry a virgin, and one who was of his new tribe. Contact of the anything replace of his own tribe. Contact with anything nuclean, even the dead bodies of his own parents, was strictly forbidden to him. His functions consisted principally in the general administration of the sanctuary and of all that belonged to the sacred service. He alone was allowed to enter the Holy of Holies on the Day of Atonement, and to consult by the Urim and Thummin (a.v.). His costains was the Urim and Thunmin (q.v.). His costaine was of surpassing spleudour, purple-red, purple-blue, searlet, golden, and white being the predominating colours of the ephod, girdle, and breastplate, which he were above robes of pure whiteness. His revenues were in the main the same as thuse of the other priests; but, according to the Tahmud, he was to be richer than these in virtue of his exalted position, and, if his own means were insufficient, he was to be provided with means by his hrethren. This points, however, to post-exilic times, when the high-priest had exchanged his character of primus inter

nares for that of priestly head of the nation, thereby becoming invested, in so far as the political subjection of the Jews to a foreign power would admit of it, with the prerogatives of ancient kingly power. Nevertheless, in the eyes of the law, the high-priest was only the equal of other Israelites. It is doubtful at what time the office of Sugan, or vice-high-priest, was created. See PRIEST.

High Seas, the open sea, including the whole extent of sea so far as it is not the exclusive property of any particular country. The rule of international law is that every country bordering on the sea has the exclusive sovereignty over such sea to the extent of three miles from its shores; but all heyond, not within three miles of some other country, is open or common to all countries. The part of sea within three miles' distance is generally called the territorial sea of the particular country or mure clausum. The distinction has little effect or mare clausum. The distinction has indeed elect on the right of navigation, but as regards fishing it is otherwise. Thus, foreign fishermen have no right to fish within three miles of the British coast with out a license from the crown, or unless some special treaty has laid down other arrangements. FISHERIES, COOPERAGE.

High Steward, a title given to several important officers. The peer appointed by the crown to preside at the trial of a peer or peeress for treason or felony is called the Lord High Steward; and there is a permanent officer of the royal household who bears the same designation. The universities of Oxford and Cambridge have each a high steward, whose duty it is to assert and protect the privileges of the university courts.

High-treason. See Treason. Highway, in Law. See ROADS.

Highwaymen, robbers who attack passengers on the public road; those who rob on foot being further distinguished as footpads. Fumous English highwaymen were Claude Duval (1643-70), Switt Mark Parism (Assert as Assert as 1624-70), Switt Francisco (1644-70), Switt mgnwaymeu were Clande Duval (1643-70), Swift Nick Nevison (hauged at York in 1684), Dick Turpin (1705-39) and his comrade Tom King, and Jerry Abershaw (1773-95). Turpin's famous ride to York is a myth, based on a story told of Nevison, whose fame has even gained him a place in Macanlay's History of England. The best-known romances of the road are W. H. Ainsworth's Rook wood and Lord Lytton's Paul Clifford. There are lists of books bearing on highwaymen in Notes and lists of books bearing on highwaymen in Notes and Queries, 5th series, vol. viii.; and biographical notices of most knights of the road ultimately came to appear in the pages of the Newgate Calendar.

High Wycombe. See WYCOMBE.

Hilarion, founder of the monastic system in Palestine, was born, according to the account of Jerome (which is adjudged by modern criticism to be no longer historical), at Tabatha, about 290, educated at Alexandria, and converted to the monastic system by St Anthony. He then lived as a hermit in the desert between Gaza and Egypt for many years, and finally died in Cyprus in 372. His memory is calchested in 21st October. memory is colebrated on 21st October.

Hilary, St, Bishap of Poitiers, although by no means among the most voluminous of the Latin Fathers, yet, from the nature of the subjects on which he wrote, chiefly connected with the Arian which he wrote, chiefly connected with the Arian which he wrote, chiefly connected with the Arian controversy, occupies an important place in the patristic literature of the Western Church. He was born of pagan parents at Limonum (Poitiers) in the early part of the 4th century. His conversion to Christianity was mainly the result of his own study of the prophecies, and did not take place till he was advanced in life. About the year 350 he was elected bishop of his native city, and immediately rose to the first place in the animated immediately rose to the first place in the animated contest of parties in the Arian controversy. Having

provoked the displeasure of the court party, he was imprisoned, and sent into exile in Phrygia; but he appears again in the Council of Selencia in 359, and soon afterwards was permitted to resume possession of his see, where he died in 367. The church holds his day on the 13th January. His most important work is that on the Trinity, but his three addresses to the Emperor Constantius, by their vehenence, and by the boldness of their language, have most attracted the notice of critics. Hilary's theological writings are especially valuable for the history of the Arian party, and particularly for the doctrinal variations of that sect, and the successive phases through which it passed between the Council of Nice and the first Council of Con-stantinople. He is often styled 'Mallens Arianorum,' and the 'Athanasius of the West, and was formally recognised as 'universa ecclesia doctor' by Pius IX, in 1851. The most celebrated of the hynnis attributed to him is the Beata nobis gandia Anni reduxit orbita,' which was early inserted in western liturgies. The English Hilary term begins on the 11th and ends on 31st January.

See two German Lives by Reinkens (1864) and Baltzer (1881); also J. t. Cazenove's Saint Hilary of Poitters and Saint Martin of Towns in the series of 'Fathers for English Readers' (1883). The best edition of the works of St Hilary is that of the Benedictine Dom. Contant (Paris, 1693; new ed. 1844-45).

Hilary of Arles, ST, was born about 403, educated at the celebrated monastic school of Lerins, and made bishop of his native city in 429. As metropolitan of Arles (Arclate) he presided at As metropolitan of Aries (Arclate) he presided at several synods, and especially at Orange in 441, the proceedings of which involved him in a serious controversy with the pape, Leo the Great A deposed bishop, named Chelidonius, having carried an appeal to Rome, a council was summoned by Pope Leo, at which Hilary was present, and in which the condemnation of Chelidonius, as well as that of another bishop, Projectus, was reversed. Hilary, however, refused to submit to the decision, and soon afterwards quitted Rome—a proceeding and soon afterwards quitted Rome—a proceeding which drew upon himself a very severe animadversion. He did not question the authority in itself, but he maintained that it was uncanonically exercised. In the end, however, he sought a re-conciliation with Pope Leo, and the dispute was brought to an amicable termination. Hilary died at Arles in 449, and was canonised, his day heing the 5th May.

lda, Sr, the patroness of Whitby, was daughter of Hereric, a nephew of Edwin of Northumbria, and was baptised at fourteen by Paulinus. Recalled by Bishop Aidan from her retreat in a French monastery, she became albess of Heorta or Hartle-pool in 649. In the year 657 she founded the famons monastery at Streoneshall or Whitby, a double house for nuns and monks, over which she ruled with remarkable wisdom for twenty-two years, dying in 680. Scott's Marmion commen-orates the belief that the fossil ammonites found here were snakes 'changed into a coil of stone' by Hilda's prayers. Her effigy still stands on the ancient seal of Hartlepool, and churches preserve her name both there and at South Shields.

Hildburghausen. See Saxe-Meiningen. Hildebrand. Sce GREGORY VII.

Hilden, a town of Rhenish Prussia, 8 miles SE. from Düsseldorf, has woollen, silk, velvet, and carpet manufactures, calico-printing, and machineshops. Pop. 7946. shops.

Hildesheim, a town in the Prussian province of Hanover, stands on a feeder of the Weser, 24 miles by rail SSE. of Hanover. It is to a large extent an antique town, with narrow streets, high-gabled houses (ornamented with bay-win-

dows and carved woodwork), and many towers. The churches are the most notable buildings, and first amongst them stands the cathedral, dating from the 11th century. It is especially interesting for its antiquarian and artistic treasures, as the for its antiquarian and attistic treasures, as the bronze gates (1015) with bas-reliefs, the clurch utensils, the so-called Irmin (q,v,) pillar, a rose-tree said to be a thousand years old, the brazen Christ pillar (1022), the carillon, &c. The St Godehard Church (1133-72) and St Michael's are splendid examples of Romanesque architecture. The socalled Templar House, the town-house (circa 1440), the linatic asylum, and certain antique private houses are the most interesting among the secular buildings. Previous to the middle ages Hildesheim was noted for its goldsmiths' work and its cathedral The industries of the modern town emschool. brace sugar-relining, iron-foundries, luick-making, machine-shops, and the manufacture of tobacco, stoves, clurch-bells, &c. Pop. (1875) 22,581; (1885) 29,386. In 822 the bishoptic founded by Charlemagne (812) at the neighbouring Elze was removed here, and around this nucleus the town grew up. In the beginning of the 16th century the bishop fell under the ban of the empire, and for nearly a century the territories of the see were alienated to other princes. Hildesheim first came to Prussia in 1803, and finally in 1866. In 1868 a most valuable discovery of ald Roman table metal-ware was made in the Galgenberg near Hildesheim. See works by Lüntzel (1858), Wachsmuth (1863), Lachner (1882), and Cuno (1886).

Hill, OCTAVIA, a lady whose name is inseparably associated with the improvement of working men's associated with the improvement of working-men's homes in London, was the granddaughter of Dr Southwood Smith, a zealous promoter of sanitary reform, and was born about 1838. Whilst still young she began work amongst the London poor under Frederick D. Maurice; and in 1864, supported by Mr Raskin, she commenced her great waster of investigate the bourse of greating the work of improving the homes of working-men in the slums and dismal alleys of the metropolis. the slums and dismal alleys of the metropolis. The plans she adopted were based upon the principle of teaching the people to help themselves, by inculcating in them proper notions of cleanliness, order, and self-respect. Her efforts have been crowned with singular success; the houses which have been improved yield a good percentage on the money spent in effecting the improvements; and lundreds of people have been helped to lead more comfortable and better lives. Miss Hill has written Homes of the London Poor (1875), Our Common Land and other Essays (1878), and papers in the magazines. in the magazines.

Hill, REV. ROWLAND, a popular but eccentrie preacher, was born 12th August 1744, at Hawkestone, the third son of a Shropshire baronet. Whilst a student of St John's College, Cambridge, he fell under the influence of Whitefield, the Methodist preacher, and at once began to tread in his footsteps. All his life through Hill retained his passion for open air preaching; and the first ten years after his ordination were spent in itinerant preaching throughout England. But having built for himself Surrey Chapel in Blackfriais Road, London, in 1783, he regularly preached there to his life's end; and, although a Dissenter, he used the services, and regarded himself as a member of the Church of England, of which he had indeed been ordained a deacon. It is said that the first Sunday-school in the metropolis was established by Rowland Hill soon after the opening of Surrey Chapel.' He died on 11th April 1833. Rowland Hill was undoubtedly eloquent and possessed a rich fund of genuine humour, but at times his manner verged upon buffoonery. His Village Dialogues (1801; 34th

ed. 1839; latest ed. 1871) has been sold in large numbers. Besides this he wrote several pamphlets, as Imposture Detected (1777), Aphoristic Observations (1790), Spiritual Characteristics (1803; 3d ed. 1860), some volumes of Sermons, Hymns, and other works. Sec Lives by Sidney (1834), W. Jones (1834), Sherman (1857), Broome (1881), and Charlesworth (1876; 2d ed. 1886).

Hill, ROWLAND, VISCOUNT HILL, general, was grandson of Sir John Hill, Bart., of Hawkestone, and was horn at Prees Hall, in Shropshire, August 11, 1772. Entering the army at lifteen, he became captain at twenty, commanded the 90th regiment in Sir Ralph Abercromby's Egyptian expedition, and was gazetted hrigadier-general in 1803. He accompanied Sir Arthur Wellesley to Spain in 1808, and was his right arm thronghout the whole Peninsular war. His conduct and courage carned him a C.B. in 1811, and three years later he was made Baron Hill of Almarez for his capture of the forts of Almarez. At Waterloo he led the brigade which swept the Old Gaard from the field, and he remained with the army of occupation as second in command until it evacuated the French territory. He succeeded Wellington as commander in chief of the army in 1828, but resigned in 1842, when he was made Viscount Hill. He died minarried at Hardwicke Grange, Shropshire, December 10, 1842, and was succeeded in list titles and estates by his nephew Sir Rowland Hill, Bart. See his Life by the Rev. Edwin Sidney (1845).

Hill. Str ROWLAND, K.C.B., originator of the uniform panny postage system and reformer of the post-oflice, was born at Kidderminster on 3d December 1795. From a very early age down to 1893 he taught in his father's school—from 1819 in Hazlewood, near Birmingham, a school-house built by himself, and afterwards at Bruce Castle, Tottenhum. Rowland was always of an inquiring and ambitions turn of mind, with a decided talent for initiating reforms. At first he basied himself with mechanical and other inventions, later in life with questions of public concern. In 1824 he was one of the founders of the Society for the Diffusion of Useful Knowledge. After he had ceased to teach, he took an interest in the socialistic schemes that were being discussed and experimented with about that time, especially by Robert Owen. Then his restless mind led him to take an active share in the colonisation of South Australia, under Wakefield's systom of colonising. Amongst other things his attention had been drawn at different periods to postul questions; and he became sensible that there existed an ingent need for a diminition in the high rates of postage, which practically excluded all but the wealthy from postal intercourse. His views on the subject, advacating a low and uniform rate of postage, to be prepaid by stamps, between all places in the British Isles irrespective of distance were published in the form irrespective of distance, were unhished in the form of a pumphlet, Post-affec Reform, in 1837. His plan was eagerly taken up by Mr Rahert Wallace, M.P. for Greenock, who gave essential help in fighting the case through parliament. Two years later fill was attached to the Treasury far the purpose of putting his projected reforms into execution; and on 10th January 1840 the present excention; and on 10th January 1840 the present uniform penny rate came into force. On 6th May following stamped envelopes and adhesive stamps were issued to the public, but the preference for the lutter was soon made manifest. In 1841 the Conservative government, which had consistently opposed the reduction of postage, came into office, and in the following year, through the influence of certain government officials who strongly resented all impostages. officials who strongly resented all innovations,

Rowland Hill was dismissed from his position. Four years later a sum of £13,000, raised by public subscription, was presented to him as a token of public esteem to a national benefactor. In the same year the Liberals returned to power, In the same year the inderial returned to power, and Hill was appointed secretary to the Postmaster-general. This office was exchanged in 1854 for that of secretary to the post-office. In 1864 he was compelled to resign owing to ill-health, and was then awarded a pension of £2000 for life. The effect of his reforms in the United Kingdom has been to raise the number of inland letters from about 77 millions unually to about 1900 millions, or about twenty-five fold, and it may be stated generally that the main principles of his plan have now been adopted in every civilised country throughout the world. Sir Rowland Hill was made a Knight Commander of the Bath in 1860. He died at Hampstead on 27th August 1879, and was bried in Westminster Abbey. Amongst the other improvements and reforms he effected in the post-office system must be mentioned the establishment of the book-post (1848), the reform of the maney-order office (1848), and of the packet ser-vice, and a multitude of minor improvements affecting the administration of the postal service. See the article Post-office; Sir Rowland Hill's book, The State and Prospects of Penny Postage (1844); and the Life (1880), by his nephew G. B. Hill, which includes Sir Rowland Hill's History of the Penny Postage.—His eldest brother, MATTHEW DAVENPORT HILL (1792-1872), recorder of Birmingham from 1839 to 1866, distinguished himself by his lubours for education and the reformation of criminals. See Memoir by his daughters (1878).

Millah, or Hulla, a town of Turkey in Asia, on the river Emphrates, 60 miles S. of Bagdad, on and out of the ruins of which it is built. Tanning, and the manufacture of silk, cottons, and woollens are curried on. The population fluctuates between 7000 and 15.000.

Hillel, surnamed Hababel ('the Babylonian') and Hazaken('the Elder'), one of the most eminent doctors of the Jewish law, was born towards the close of the 1st century B.C. in Babylonia, of poor parents, but in the famile line of royal (Davidian) descent. When forty years old—so rans the Talmudic account—he migrated into Palestine for the purpose of studying the law under Shemnia and Abtalion, the great masters of the period. Five or six years after Herod land mounted the throne Hillel was elected president of the sauhedrin. The range of his acquirements is said to have been immense, embracing not only Scripture and tradition, but nearly all branches of human and superhuman knowledge. Yet he was one of the meekest, most modest, kind, and simple-hearted men. Hillel was the first who collected the numberless traditions of the oral law, and arranged them under six heads (see MISHINA). Between him and his contemporary Shammoni and their respective followers there arose a spirit of keen rivalry, the latter being advocates of greater strictness and rigour in the interpretation of the law. Hillel died about 10 A.D. Compare the Lives of Christ, and Delitzsch's Jesus and Hillel (2d ed. 1867).

Hiller, FERDINAND, pianist, musical composer, and writer on music, was horn at Frankfort-on-Main on 24th October 1811. Having been a pupil of Hummel, he began to teach in his native town; but from 1829 to 1836 he laboured in Paris. The next nine years he spent partly in Italy, partly in Germany; it was ducing this period thut he produced his best work, the oratorio Die Zersterung von Jerusalem (1839). Then, after three years'

service as municipal music-director in Dasseldorf (1847–50), he proceeded to Cologne, where he filled a similar post until his death, 10th May 1885. Amongst nearly 200 musical works which he published only a small number have retained their facting. His Uebungen zum Studium der Harmonic und des Kontrapandtes (12th ed. 1886) is extensively used. But as a writer on musical subjects Hiller claims a better place. His books in this department contain much valuable criticism, elegantly and well expressed—1ns dem Tondeben unserer Zeit (1868-71), monographs on Beethoven (1871) and Mendelssohn (1874; 2d ed. 1878), Musikalisches und Personliches (1876), Briefe un eine Ungenannte (1877), Kunstlerleben (1880), and Erinnerungsblatter (1884).

Hill-forts, the refuges and strungholds of the Their range in time extends from the early pre-historic through the early historic periods of the racial areas in which they are found. They have no more definite form than that of a prevailing but irregular circularity. The site selected is usually irregular circularity. The site selected is usually enclosed and fortified with due regard to its specialfor instead of occupying the whole hill-top may occupy only the most defensible part of it. In other cases the whole eminence may be surrounded other cases the whole enhance may be shrounded by defensive constructions completely encircling and protecting its upper portion. Occasionally these forts, though situated among the bills, are planted in the lower ground, commanding an ex-tent of meadow-land or pasture. With regard to their construction, the hill-forts are usually either earthworks or stoneworks, rarely a mixture of both. In France the Gaulish forts of the pre-Roman period were often such extensive works as to be termed oppida by the invading Romans. Though termed oppida by the invading Romans. Though built of dry-stone masonry, the parts of the walls most exposed to attack were bound together by great logs of wood, placed both longitudinally and transversely within the thickness of the rampart, so as to resist as much as possible the assaults of the battering ram. The great dry-built stone rampart of the prehistoric fort at Burghead, in Elginshire, is similarly strengthened by logs of oak, but it is the only example of this method of construc-tion yet known in Scotland, where hill-forts are perhaps more numerous than in any other European country. They are generally called 'duns' (sec Dun) in the northern and 'camps' in the southern DUN) in the northern and 'camps' in the southern districts, where the older term survives in connection with a number of the principal forts, as Dumbarton (Dun Bhreatan), Dundonald in Ayıshire, and Dunpelder in Lothian, not to mention Dun Edin as the old name of Edinburgh. Among the most remarkable of the hill-forts of Scotland may have remarkable of the hill-forts of Scotland may he mentioned those of the two Caterthans in Fornentioned those of the two Catertains in Parfarshire—one a good example of the fort with earthen rampart, and the other with walls of dry stone—the Tap o' Noth, and the twin-summits of Benachie, each with its massive fortifications of stone, in Aberdeenshire, the remarkable stone fort of Dun Taathal on Drummond Hill, overlooking the interior of the water of the Lyap and the Tay, and one equally remarkable, called Dun-dalamh, in a similar situation in Laggan on the Spey, Inverness-shire.

Many of the dry-stone forts in Scotland present the peculiar feature of a partial vitrifaction of the materials of their walls. The same thing has been observed in connection with similar forts in Ireland, France, and Hungary. The attempt to account for the existence of this peculiarity has given rise to much speculation and controversy. But it seems to be clearly established that the so-called vitrified forts do not differ from the other dry-stone forts, if the vitrifaction be not regarded as a process of

construction. No relevant and conclusive evidence on this point has been obtained from examination of the structures themselves; and against the arguments in support of the view that the vitrifaction was intended as a cementing process we have to put the facts (1) that no fort is wholly vitrified; (2) that where vitrifaction exists it occurs in natches, affecting sometimes a portion only of the thickness of the wall; and (3) that when it occurs on the exterior surface of the wall the upper parts are sometimes found partially virified, but with no trace of vitrifaction on the portions underneath. Among the best known of the so-called vitrified forts in Scotland are the Tap o' Noth in Aberdeonshire, Craig Phadric and Dunbhandgall in Inver-ness-shire, Knockfarril in Ross-shire, Dun Mac Uisneachan in Argyllshire, and Finhaven in For-far-hire. In Wales stone forts are most numerous, far-hire. while in England carthworks predominate. The earthen forts of Sussex explored by Colonel Lane Fox are sometimes of considerable magnitude, that of Cisslary, for instance, enclosing a space of 60 acres. They are, as a rule, of prehistoric origin. Some of the stone forts of Ireland, especially those of the Aran Isles, are of great magnitude and well preserved. Photographic views of them are given in Lord Dunraven's book on Early Irish Architecture.

Consult also Dr Christison's 'Prehistoric Forts of Peeblesshire,' and 'The Duns and Forts of Lorne' in the Proceedings of the Society of Antiquaries of Scotland (vols. xxi. and xxiii.); 'Mémoires sur les Ouvrages de Fortifications Gauloises,' &c. in the Compte Rendu du Congrès Archeologique de France, at Toulouse in 1874 (p. 427); 'Les Camps Barbanes fortifiés en Hongrie,' by F. Romen, in the Compte Rendu of the Congress of Prehistoric Archeology held at Budapest in 1876 (vol. ii. p. 68); and 'Helvetische Denkmaler,' by Dr F. Keller, in Mutheilungen der Antiquarischen Gesellschaft in Zürich (vol. xxi.).

Hill Mustard. See Bunias.

Hilversum, a village in North Holland, 18 miles by rail SE, from Amsterdam, manufactures woollens and carpets. Pop. (1889) 12,199.

Himalaya (properly Hima'laya; from two Sanskrit words meaning 'snow-abade') is, strictly speaking, the southern escarpment of the great Central-Asian plateau in so far as it falls between the Indns and the Brahmaputra. Thus limited, it extends from 73° to 95° E. long., over a distance of some 1500 miles. The Himalayas are not a single range, but a system of for the most part parallel ranges lying obliquely to the general direction of the system. They from the plain of the Ganges in northern India like a stapendom mountain wall, bending back in the west like a scimitar, the sharp edge turned next India. On the east the system is connected with the mountain-ranges of southwest China and northern Burma and Siam. On the north it is backed by the lofty plateau of Tibet, which ranges in elevation from 10,000 to 17,000 feet. At its north-westen extremity it runs up into the Pamir plateau, from which radiate also the Hindn-Kush and the Kuen-Lun Mountains. The southern foot of the system rests upon the plain of the Ganges, which nowhere rises more than 1000 feet above the level of the sea. The edge of the outermost hills is skirted, for a distance varying in width from 10 to 15 miles, ly a helt of swampy grass-land, traversed by nunerous singsish streams. These in many places overflow and form standing swamps, fringed with gigantic reeds. This belt, called the Tarai, does not extend west of the print where the Ganges breaks through from the mountains. These districts, owing to the great quantity of stagnant water and the great profusion of rank vegetation, are extremely unhealthy; many parts reek with

fovers of a very malignant type. Next above the Tarai lies a belt of forest of about the same width, called the Bhabar. Its soil consists of sand, liberally strewn with shingle beds and boulders. The waters of the minor streams that come down from the higher mountains are generally absorbed by this spongy taba-slope, and, passing through it underneath the surface, accumulate again on the upper edge of the lower-lying Tarai.

Above the Bhabar rise the foot-hills of the Himalayan system, generally designated the Siwalik Hills, or sub-Himalayan ranges. They vary in beight from a few hundred feet up to 4000, and present steep faces to the plains; on the northern side the slope is gentler, being mostly met at short distances from the summit by the southern flanks of the inner ranges. Geologically the Siwalik Hills belong to the Tertiary formation, and to the Piocene rather than to the Miocene period. From the ranges near the Jumma great quantities of fossils, mostly mammals and reptiles, all land and fresh-water mimals, have been obtained. It is on the north side of the Siwalik foot-hills that the first mountains appear. They rise up abruptly to 10,000 feet, and cover a surface zone of 50 miles in breadth. This division embraces a large number of irregular ridges, characterised by great complexity of geological structure. They yield marine fossils. On these ranges stand the samutorimus, such as Simla, Darjiling, Almora, &c., which are so escential to Europeans during the lot months. The space between the outer members of these ranges and the Siwalik foot-bills is occupied by narrow, shallow, longitudinal valleys, called Dun in the west and Mari in Nopal. They are partly covered with loose shingle and boulders, partly worn into terrace-like steps, partly broken by low, obliquely lying, watershed ridges, which throw off numerous small streams.

In the Himalayas proper two main axes can be determined with tolerable distinctness. One, the sonthern, contains the line of the great snowy peaks; the other, the northern, forms the water-shed between the rivers of India and the rivers of Tibet. The mountains in the southern chain are amongst the loftlest in the world; a very great number of them exceed 20,000 feet (34 miles) in beight. One of these, Mount Everest (29,002 feet), is the highest measured mountain in the world. Other loftly peaks in this division of the Himalayan system are Mount Godwin-Austen (28,265), the second highest in the range; Kinchinjinga (28,156); Dhawalagiri (26,286); Nanda-Devi (25,700); Trisul (23,400), and several others more than 22,000 feet in ultitude. The chain of great snowy peaks is, strictly speaking, a series of mountain-groups, each of which is convected with the articular decimal of which is connected with the watershed chain to the north by a transverse ridge, covered with snow and fragmently bearing on its shoulders peaks that tower up to the beight of 25,000 feet. Graham, who in 1883 ascended Kabru to a height of 23,700 feet, believed that there are other peaks which will be found to exceed Mount Everest in altitude, for the central parts of the system next Tibet have not yet been surveyed or even explored with anything approaching to thoroughness, mainly because of the jealousy and exclusiveness of the Tibetan authorities, within whose territory much of the leftiest region of the Himalayas falls. These transverse spars from the northern chain, terminating in stupendous monotain knots, form deep valleys on either side in the space between the two chains. These deep valleys, fringed with over-banging glaciers, are the cradles of the great rivers of northern India. Here are the sources of the Canges and the Indus and the Brahmaputra, and

of hundreds of rivers and streams whose waters eventually reach the ocean through the mouths of these three great channels. The rivers of the Himalayas mostly make their way through the mountains at the bottom of wild and narrow gorges, often several thousands of feet deep, the path through the various chains being mostly at right angles to the strike of the ridge. The inclination of the rivers is, however, nowhere very steep, except along one line: about ten miles south of the chain of great peaks the rivers descend about 5000 feet in the course of a few miles.

This indicates that the whole region must at one time have been bodily upheaved, and before the period of upheaval there existed here a natural ridge or fold of the earth. Geologists indeed believe that the entire site of the Himalayan system, taken in its widest extent, in which it embraces the whole of the Tibetan platean as far as the outer Knen-Lan Mountains, was in distant geologic ages the bed of a vast sea or ocean. The mountains are believed to be the result of the action of mechanical forces, such as horizontal compression and tension, combined with lateral stress and stain, operating upon the cooling crost of the earth in a region where, owing to the recent evaporation of the ocean, it was softest and most pliable, and therefore offered least resistance. The rocks of this part of the system are principally crystalline greiss and mica schist, with veins and zones of granite intruding. The snowy region of the Himalayas is plentifully studded with glaciers, some of them of great extent: one has been surveyed in the western part of the system 36 miles in length. In the same rogion they descend to 11,000 and 12,000 feet, in the custom part of the system not lower forces, such as horizontal compression and tension. the same region they descend to 17,000 and 12,000 feet, in the custom part of the system not lower than 13,000 and 14,000 feet; and on the Tibetan side they are seldom found to come lower than 15,000 and 16,000 feet. This difference is partly due to the difference between the angles of declivity on the north and on the south sides of the clivity on the north and on the south sides of the envity on the north and on the south sides of the chief ranges, partly also to differences in climatic conditions, the principal being the beavier snowfall and the greater rainfull which take place on the south, and the greater dryness of the atmosphere on the Tibetan plateau. Conformably with these facts, the snow-line ranges higher on the Tibetan is the ladion, whose any the sector. side than on the Indian : whereas, on the watershed chain, it seldom descends lower than 18,000 feet, and on the tableland remains at 20,000, on 15,000 or 16,000 feet. The watershed chain has been little explored; it lies chiefly within Tibetan territory. The only exception to the former statement occurs on the west, where the Mustagh range, which is crossed by the pass of Karakoram (18,350), towers above the mountain valley of Kashnir, forming its northern wall, as the Pirpanjal, a range of the outer Himalaya division rising to 14,000 or 15,000 feet, shuts it in on the south. This watershed chain forms an almost continuous line of peaks, its crest being probably over 18,000 feet in elevation. So far as is known, it is only broken by one pass of less altitude than 16,000 feet, namely the Dras pass leading from Kashmir, which is 11,300 feet above sea-level. The Niti Pass (16,676), south-east of Ladak, connects the best roads from India and from East Turkestan.

The Himalayas possess few lakes. In the east, north of Sikkim, are Yamdok-cho or Palti, 45 miles in eircumference, with an island, 2000 to 3000 feet high, in the centre; and Chomto-dong, 20 miles long by 16 broad, at an altitude of 14,700 feet. More to the west lie the holy Tibetan lakes of Manasarowar and Rakas Tal, which give birth to the river Sutlej. Besides these there are Nainital in Kumaon and the Lake of Kashmir. In nearly all parts of the Himalayas metallic ores

have been ascertained to exist. But gold, iron, copper, and lead are the only minerals extracted. Gold is largely mined in Tibet; copper and iron ore are worked in Kumaon and Garwhal.

In the lower, hotter, and moister parts of the Himalayas, chiefly towards the east, the flora is closely related to that of the Malay Peninsula and islands. Fatther west, as the drier, colder parts are approached, it approximates to the Enropean flora. On the lower ranges the chief vegetative forms are sals, sissus, bamboos, palms, acacias, rhododendrons, ferns, orchids, &c. in the east, and oaks, pines, spruces, firs, cedars, deodars, and others in the west. On the highest ranges the principal trees are conifers and poplars, with a great variety of alpine plants. The Enropean beech does not grow on the Himalayas. Cultivation does not ascend higher than 7000 fect, except in a few of the warmer valleys. The plants of greatest commercial importance cultivated on the Himalayan slopes are tea and cinchona. In respect of its fauna this region is one of the richest in the world, particularly in birds. Aurong the more remarkable animals may be mentioned bears, wild eats, leopards, tigers, sin-bears, eat-bears, yaks, musk-deer, wild goats, wild sheep, wild dogs, flying squirrels, the bamboo-rat, and water-shrews. Insects are almost as numerous as birds.

Within Indian territory most of the inhabitants of these mountains are Hindus. The Tibetan portions are occupied by peoples of Turanian stock. No statement can be given of the total number of these mountaineers; many of them live in remote valleys, and are almost unknown, whilst many others dwell outside the limits of the British dominions. In Hindu mythology these majestic mountains are invested with great sanctity. Thousands of pilgrims travel year after year to the holy sources of the Ganges. The temples they visit stand beside the glaciers from which the river emerges, at Gangotri, Kedarnath, and Badinath. Other temples, searcely less sacred, stand beside the source of the Junna at Jannotri.

beside the source of the Jumma at Jamnotri.

See Medlicott and Blanford, Manual of the Geology of India (3 vols. Calentta, 1879); J. D. Hooker, Himalagan Journals (2 vols. Lond. 1854); the works of B. H. Hodgson; Godwin-Austen, in Journ. As. Soc. Benyal (1867-73) and Pron. Roy. Geog. Soc. (1883 and 1884); W. W. Graham, in Proc. Roy. Geog. Soc. (1884); Clements Markham, Boyle in Thibet and Manning in Lhass (1876); T. Saunders, in Geog. May. (1877); Sir H. Strackey, in Roy. Geog. Soc. Journ. (vol. xxiii.); Memoirs of Geological Survey of India; A. Wilson, Abode of Snow (1875); Ujfalvy, Aust dem westlichen Himalaja (1884); and Strackey, The Himalaya (1890).

Hint'era, an ancient city on the north coast of Sicily, east of Panormus (Palermo), and near the month of the river Himera, was a Greek colony established 649 A.D., and destroyed in 409 by the Carthaginians, who afterwards built Thermæ (mod. Termini) across the river. Stesichorns was a native of Himera, Agathocles of Thermæ.

Himilco. See Carthage.

Himyaritic, a name formerly in use for the language of the ancient Sabaan inscriptions in the south-west of Alabia. See ARABIAN LANGUAGE, SABLEANS, SEMITIC LANGUAGES.

Hinckley, an ancient town of Leicestershire, and partly also of Warwickshire, 13 miles SSW. of Leicester. Its parish church, with a beautiful oak roof, is supposed to have been erected during the reign of Edward III. Hinckley has manufactures of cotton losiery and of loots and shoes. It stands on the old Watling Street. Pop. (1851) 6111; (1881) 7673.

Hincmar, a celebrated churchman of the 9th century, of the family of the Counts of Toulouse,

was born in 806. He was educated in the monastery of St Denis; was named abbot of the abbeys of Compiegue and St Germain; and in 845 was elected Archbishop of Rheims. Rothadins, Bishop of Soissons, and suffragan of Hinemar, deposed a priest of his diocese, who appealed to Hinemar, as metropolitan, and was ordered by him to be restored to office. Rothadins, resisting this order, and having been in consequence excommunicated by the archbishop, appealed to the pope, Nicholas I., in 862, who at once ordered Hinemar to restore Rothadins, or to appear at Rome to vindicate the sentence. Ultimately Nicholas annulled the sentence. Hinemar, after some denur, was forced to acquiesce, and Rothadins was restored to his see. Hinemar wrote much against the strong predestinarian views of the monk Gottschalk, whom he united with others in degrading and implisoning. Gottschalk died in prison after eighteen years' confinement.

The conduct of Hinemar is also historically interesting in relation to the temporal power of the medicval papacy. Under Adrian II. a question arose as to the succession to the sovereignty of Lorraine on the death of King Lothaire, the pope favouring the pretensions of the Emperor Lewis in opposition to those of Charles the Bold of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the eensures of the elurch, Hinemar offered a firm and persistent opposition. He was equally firm in resisting the undne extension of the royal prenogative in ecclesiastical affairs. When the Emperor Lewis III. songht to obtrude an unworthy favourite upon the see of Beanvais, Hinemar holdly remonstrated, and fearlessly denounced the unjustifiable unsurpation. Hinemar died in the year 882.

His works were collected by the Jesuit Simmond (1645), and are to be found in Migne's Cursus Patr. Compt. His Annales Bertiniani, from 861 to 882, are in vol. i. of Perte's Monumenta. See Prichard, Life and Times of Hincmar (1849), and German works by Noorden (1862), Sdralek (1881), and Schrors (1884).

Hind, the female of the Stag (q, v) or Red Deer. The term is also sometimes applied to the female of some other deer—though never to any other British or European species—and is sometimes even extended to female antelopes.

Hind, John Russell, astronomer, was born at Nottingham, May 12, 1823. At an early period he became an enthusiast in the study of astronomy, and in 1840 obtained, through the influence of Professor Wheatstone, a situation in the Royal Observatory at Greenwich, where he remained till June 1844. Hind was then sent as one of the commission appointed to determine the exact longitude of Valentia, and on his return became the observer in Mr Bishon's Observatory, Regent's Park, London. Here he calculated the orbits and declination of more than seventy planets and comets, noted a number of new movable stars, and between 1847 and 1854 discovered ten minor planets (see PLAN-ETOIDS). In 1851 Hind obtained from the Academy of Sciences at Paris their Lalande medal, and was elected a corresponding member; in 1852 he ob-tained the Astronomical Society of London's gold medal, and a pension of £200 a year from the British government; in 1853 he undertook the editing of the Nautical Almanuc. Hind's scientific papers were generally published in the Transactions of the Astronomical Society, in the Complex Rendus of Paris, and the Astronomische Nachrichten of Altona. Amongst his works are Astronomical Vocabulary (1852), The Comets (1852), The Solar System (1852), Illustrated London Astronomy (1853), Elements of Algebra (1855), and Descriptive Treatise

on Comets (1857). In 1880 he was president of the Royal Astronomical Society.

Hindi, Hindustani. See India.

Hindley, a town of Lancashire, 3 miles SE. of Wigan by rail. There are numerous coal-works in the vicinity; and the cotton manufacture is largely carried on. Pop. (1851) 5285; (1881) 14,715.

Mindu Kush (the 'Indian Caucasus' of Alexander the Great's historians) forms the westward continuation of the Himalayan system, of which it is separated by the chasm through which the Ludus breaks its way to the plains. It strikes off from the south-west angle of the Pamir platean, and extends westwards for 365 miles to the Bamian valley in Afghanistan, separating that country on the south from Turkestan on the north. Near its point of origin several rivers take their hirth; the Oxus goes off north-west through Turkestan, and the Helmund south-west through Turkestan, and has a total width of about 200 miles. Unlike the Himalayas, it sinks suddenly to the plains of Turkestan on the north. It is crossed by several passes, at an average elevation of 12,000 or 13,000 feet. From the Bamian valley the range is continued westwards as a low watershed elevation, known as Koh-i-Baba. (Koh-i-Baba is also the name of a peak in the Hindu Kush.) The peak of Hindu Kuh, about 80 miles to the north of the city of Kahul, is estimated to be more than 20,000 feet above the sea. The highest point in the range that has been yet measured exceeds 23,000 feet. The flanks of the mountains are mostly harren and destitute of cultivation; but minerals, especially iron, occur in great abundance. The inhabitants consist principally of Dards (see Datdistan) and Shins, the latter the descendants of the original colonists of the ecuntry. A loose kind of Mohanmedanism is the prevalent form of religion. See J. Biddulph, Tribes of Hindu Kush (Calentta, 1880).

Hindustan, 'the land of the Hindus,' is a term of the same class as Turkestan or Afghanishm. See INDIA.

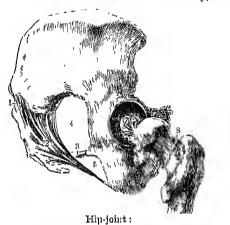
Hinnom, Valley of. See Gehenna.

Hinny, the hybrid produced between a horse and a female ass. It is smaller than a mule, but the bady is more bulky in proportion to the legs, and its strength is inferior. It is less valuable than the mule, although it is more docile. The hinny is rare. It was described by some of the earlier naturalists as a hybrid between the ox and the ass.

Hinojosa-del-Duque, a town of Spain, 45 miles NNW. of Cordova, with some linen and woollen manufactures. Pop. 9500.

Hinton, James, aurist and metaphysician, was boun in 1822, son of a Baptist minister, studied medicine at St Bartholomew's Hospital, and, after much travel, settled about 1850 to a London practice, ultimately becoming a specialist in annal surgery. From 1862 till 1874 he was a locturer on this department at Guy's Hospital. He died 16th December 1875. In his lifetime he published Man and his Dwelling-place (1859), Life in Nature (1862), and the Mystery of Pain (1865); and after his death appeared, with other works, Philosophy and Religion (1881) and The Law-breaker and Coming of the Law (1884). These books contain striking and suggestive things enough, but their author evidently took himself too seriously as a metaphysician, as has also been done by a handful of disciples. See his Life and Letters, by Ellice Hopkins (1878).

Hiogo. See Hyogo. Hip. See Rose. Hip-joint is a ball-and-socket joint formed by the reception of the globular head of the thighbone (or femur) into the deep pit or cup in the os innominatum, which is known as the acetabulum. If the variety of the movements of this joint—viz. If the variety of the movements of this joint—viz. If the variety of the movements of this joint—viz. If the variety of the movements of this joint—viz. If the variety of the movements of the same time its great strength are considered, it may well claim to be regarded as the most perfect joint in the whole body. The reader will form a tolerably clear conception of the relative forms of the acetabulum and the head of the thigh-hone from a glance at the figure, in which the surrounding parts are cut away, and



1, 2, 3, pelvic hyaments; 4, 5, the greater and lesser sacro-tschiate formina; 6, the cotyloid ligament; 7, the toinid ligament; 8, the cut edge of the lower part of the capsular ligament.

the thigh-hone is drawn ont of its socket. The ligaments are usually described as five in number—the cupsular (consisting of circular and longitudinal fibres, of which the most important are the ilio-femoral or y-shaped band), teres or round, cotyloid, and transverse ligaments. Of these the capsular ligament, supposed to be removed in the figure, is the most important, and extends from the edge of the cup to the circumference of the neck upon which the ball is carried, enclosing the bony parts in a strong sheath. The great use of the capsular ligament is to limit the extension of the hip-joint, and thus to give steadiness to the creet posture. The teres or round ligament is in reality triangular rather than round, and has its upex attached to the head of the thigh-bone. The joint is much strengthened by a large number of surrounding muscles, some of which are of considerable power. The experiments of Weber show that atmospheric pressure is the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest.

DISEASE OF THE HIP-JOINT.—Hip-disease differs in many points of importance from other joint-diseases. Its connection with scrofula is more distinctly marked than that of most other joint-diseases, and it almost always occurs before the age of pulerty. It comes on, in children or young persons of a scrofulous constitution, from very slight causes; thus, it is often traced to over-exertian in along walk, a sprain in jumping, or a fall; and in many cases no apparent cause can be assigned. In the early stage of the disease the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint, and often communicate with its interior; and the

acetabulum and the head and neck of the thighbone become disintegrated, softened, and gritty. In a still more advanced stage dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligament becoming more or less destroyed, and the head of the hone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass spronting up from the bottom of the cavity, and pushing the head of the hone before it. It is of extreme importance that the symptoms should be detected in an early stage of the disease.

As the disease advances abscesses occur around the joint. True shortening of the limb now takes place, which at the same time becomes addacted and inverted. From this stage, if the health is pretty good, and the lungs are sound, the patient may be so fortunate as to recover with an anchylosed (or immovable) hip-joint; but the probability is that exhaustion and heetic will come on, and that death will supervene, from the wasting influence of the pudent discharges occasioned by the diseased bone. The duration of the disease may vary from two or three months to ten or more years.

As the treatment must be left entirely in the hands of the surgeon it is unnecessary to say more than that the most important points are perfect rest to the affected part, which may be effected in various ways, the internal administration of conliver oil and tonics, and the application of counteriritation by means of an issue behind the great truchanter.

Hipparchus, the first systematic astronomer on record, was born at Nievea, in Bithynia, and flourished between 160 and 125 B.C. Of his personal history nothing is known except that he observed at Rhodes. The only authority we have regarding his researches is the Syntaxus of Ptolemy; from it we learn that Hipparchus discovered the precession of the equinoxes and the eccentricity of the sun's path, determined the length of the solar year and the distances of the sun and moon respectively from the earth, invented the planisphere, drew up a catalogue of 1080 stars, and fixed the geographical position of places on the earth by giving their longitude and latitude. All that we have of his works is a commentary to the poetical description of the stars by Aratus, published in Patavius's Uranologia (1630). See Delambre's Histoire de l'Astronome Ancienne (Paris, 1817).

Hipparion, a fossil genus of Equida. See Horse.

Hippias and Hipparchus. See Pisis-

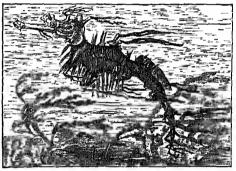


Hippocampus antiquerum

Hippo. Sec BONA.

Hippocampus (Gr.; a sea-monster on which the gods tode), commonly called SEA-HORSE, a genus of curiously modified maxime fishes, which, with the Pipe-fish (q.v.), compose the family Syngnathidae, belonging to the order Lopholnanclui, whose gills are disposed in tufts. They derive their generic name from the remarkable

likeness which the head and neck hear to those of a horse, or perhaps even more strikingly to those of the knight in a set of chessmen. They are all characterised by the prehensile tail devoid of a fin, by which they cling to the stems of seaweeds or corals, or even to each other; the body is compressed and more or less elevated; the shields have more or less prominent tubercles or spines; the hinder part of the head forms a flattened crest, terminating above in a prominent knob (coronet); pectoral fins and a dorsal fin are present. The males have a pouch beneath the tail, in which they carry the eggs until they are latched. As in all other fishes of the order, there is a long snont, and at its extremity a small toothless month. The fins vibrate with great rapidity, and present the appearance of a rotating wheel or a delicate waving web, but the animals move only slowly and for a short distance at a time, usually in a half upright posture. There are about twenty species, mostly inhabiting tropical seas; some have a wide area of distribution, as they are not unfrequently carried to great distances by floating materials to which they have attached themselves. H. antiquorum of Australia, the Atlantic, and Mediterranean, is occasionally found



Phyllopteryx eques.

on British shores. The allied genus Phyllopteryx, of which three species are known from Australia, is remarkable for its long streaming filaments, which very closely mimic the fronds of the Fucus among which it lives.

Hippocampus. See Br.un.

Hippocrats (vinum Hippocraticum, 'wine of Hippocrates'), an aromatic medicated wine, formerly much used as a cordial. It was prepared from white wine, flavoured with cinnamon and other spices, lemon peel, almonds, &c., and sweetened with honey or sugar.

Hippogrates, the most celemated physician of antiquity, was the son of Heracleides, who was also a physician, and belonged to the family of the Asclepiade, Hippocrates himself being either mineteenth or seventeenth in descent from Esculapins. His mother, whose name was Phænarete, was said to he descended from Hercules. He was born in the island of Cos, probably about 460 n.c. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Gorgias of Leontini, the celebrated sophist, and Democritus of Abdera, whose cure, when he was mentally deranged, he afterwards effected. After visiting some parts of Greece, particularly Athens, then at its intellectual zenith, he settled in practice at Cos. Hedied at Larissa, in Thessaly, but at what age is uncertain, different ancient authors stating it to have been at 85, 90, 104, and 109 years. Clinton (Fasti Hell.) places his death 357 n.c., at the age of 104. We know little more of his personal history than that he was greatly esteemed as a physician and an author, and that he raised the medical school of Cos to a very high reputation.

His works were quoted by Plato, who compared him to Polyeletus and Phidias, and by Aristotle, who called him 'the great.' Various stories are recorded of him by Greek writers, to which, being and we find legends regarding him in the works of Arabic writers, who term him 'Bokrát,' while the European story-tellers of the middle ages celebrate him under the name of 'Ypocras,' and, in defiance of chrenalogy, make him professor of medicine at Rome, with a nephew of wondrous medical skill, whom he despatched in his own stead to the king of Hungary.

The works bearing the name of Hippoerates, and termed the Hippocratic Collection, are more than sixty in number, and were divided by Dr Greenhill into oight classes. The first class comprises works certainly written by Hippocrates, including Prognostica; Aphorismi: De Morbis Popularibus; De Matione Vatus in Morlis Acutis: De Acre, Aquis, et Loris; and De Capitis Valueribus. Some entinest erities doubt the gennineness of some portions of the Aphorismi, the werk by which Hippocrates is most popularly known. The second class is composed of works perhaps written by Hippocrates. They are cleven in number, and one of them is the well-known Jusjurandum, or 'Hippocratic Oath.'

The others consist of works written before Hippocratical manufactures the second class is consistent and the second content of the second conte

by quite nuknown authors, wilful forgeries, &c.

For anything like a full account of his views we must refor to the various writers who have breated of the history of medicine. We can here only mention that he divides the causes of disease into two principal classes: the first consisting of the influence of seasons, climates, water, situation, &c.; and the second of more personal causes, such as the food and exercise of the individual patient. To the influence which different climates exert on the human constitution he confidently ascribes both the conformation of the body and the disposition of the mind, and hence accounts for the differences between the Greek and the less hardy Asiatic. The four fluids or humans of the body (bleed, phlegm, yellow bile, and black hile) were regarded by him as the primary seats of discuse; health was the result of the due combination (or crusis) of these, the disturbance of which produced illness. When a discuse was proceeding favourably these humours underwent a certain change (or coction), which was the sign of returning health, as preparing for the expulsion of morbid matter, or erisis, those crises having a tendency to occur at definite periods, which were thence called 'critical days.' His treatment of diseases was cantious, and what we now term expectant; it consisted chiefly and ofton solely in attention to diot and regimen; and he was sometimes reproached with letting his patients die by doing nothing to keep them alive.

The works of Hippocrates were translated at an early period into Aralic. They were first printed in a Latin translation in 1525 at Rome. The first Greek edition (the Aldine) appeared the following year at Venice; an edition by Merenriali appeared in 1588, one by Foes in 1595, and one by Van der Liuden in 1665. Others have appeared under the editorship of Chartier, Külm, &c. The best edition, with an admirable Fronch translation, is that of Littré (10 vols, 1839-61). A scholarly edition by Ermerius, with a Latin rendering, was jullished in 1859-65 at Utrecht, at the expense of the university of Amsterdam. An excellent English translation of the Genuine Works of Hippocrates was published in 1849, in 2 vols., by Dr

Adams of Banchery, Aberdeenshire.

Hippocrene (derived from hippos, 'a horse,' and krone, 'a fountain'), a fountain on the northern slope of Mount Helicen, in Greece, sacred to the

Muses and Apollo, which, according to the mythical account, was produced by a stroke from the hoof of the horse Pegasus (q.v.). It is identified with a spring at the modern Makariotissa.

Hippodami'a, the beautiful daughter of Enomans, king of Pisa, in Elis. It had been predicted to her father that he should be slain by his future son in-law; he therefore stipulated that every suitor of his daughter should run a chariot-race with him, and that death should be the consequence of defeat. At length Pelops bribed the king's charioteer, and thus succeeded in reaching the goal before Œuomans, who, in despair, killed himself, Hippedamia became by Pelops the mother of Atrens and Thyestes.

Hippodrome (Gr. hippos, 'a horse,' and dromos, 'a racecourse'), the Greek name for the place set apart for horse and chariot races. dimensions were, according to the common opinion, half a mile in length, and one-eighth of a mile in breadth. In construction and all the most important points of arrangement it was the counterpart of the Roman Circus (q.v.). See also Olympic Games, Constantinoplè

Hippogriff, or Hippogryph (Gr. hippos, 'a horse,' and the word gryph, 'griffin'), a fabulous animal, nuknawn to the ancients, which is represented by modern writers as a winged horse with the head of a griffin. The hippogriff figures as the horse of the Muses, and plays a conspicuous rôle in the Orlando Furioso of Ariasta.

Hippolytus, a Christian writer who enjoyed great celebrity in the first half of the 3d century, but of whose personal history we know but little with certainty. He was born most likely about 155-160 A.D., and died about 235 or 236. The first to mention him is Eusebius, who says he was a bishop somewhere, and some writers have placed his diocese in Arabiu, while almost all the eastern writers style him Bishop of Rame. He is usually described by modern writers as Bishen of Portus, near Rome, but for this title there is no evidence earlier than the middle of the 7th century. He may have been a native of the East, and he is said to have been a disciple of Treneus; but this may have been either in Asia Minor, in Gaul, or in Rame itself, which Eusebins tells us that Ireneus remens visited about 178. An entry in the Liberian Catalogue of hishops of Rome tells that Pontians the bishop and Hippolytus the presbyter were transported as exiles to the mines of Sardinia, where ore long they perished, their bodies being earried back to Rome. Prudentius (5th eentury) gives a different but much less credible account of the martyrdom of Hippolytus, according to which he was torn in pieces by wild horses like the Hippolytus of mythology. He tells us that he was infected with the Novatian heresy, but recanted on the way to martyrdom. Such was the unsatisfactory state of knowledge when the recovery at Mount Athos by Minoides Mynas in 1842 of the treatise against heresics east fresh light upon Hippolytus as its presumptive author. It was Hippolytus as its presumptive author. contained in a 14th-century MS., and when published by Miller in 1851 was recognised as forming part of the fragmont ascribed to Origen and entitled the Philosophumenu. Its appearance opened up a grave discussion. The Origenistic authorship was soon abandoned, and attempts were made by Bant to ascribe it to Gains, by De Rossi to Tertullian, by Armellini to Novatian. Jacobi advanced the claims of Hippolytus, and this theory was supported by Bunsen and Wordsworth, and so conclude sively proved by Döllinger as to persuade almost every scholar save Lipsius, who still continued to describe the author as Pseude-Origenes.

From the treatise itself we learn that the author

lived at Rome, and took an active part in church affairs under the bishops Zephyninus and Callistus. Dollinger points out that throughout Hippolytus never recognises Callistus as bishop, and treats him only as the founder of a school. Besides he assails his moral character and his antecedents, chaging him with dishonesty, with criminal laxity of dis-cipline, and with the Patripassian heresy; while Callistns again retorted upon his opponent with a counter-charge of Ditheism. Dollinger held that Hippolytus claimed to be the real Bishop of Rome himself, and that he was thus the first antipope in the history of the Roman Church. This would explain the circum-tance that a writer so learned and outstanding as Hippolytus could be taken by the Eastern Church for the actual Bishop of Rome, while to western writers who did not receive him as such he seemed guilty not only of schism but of heresy. But the grave difficulty remains of being obliged to believe that a schism so serious, headed by the most illustrious theologian of the time, and lasting at the very lowest five or six years, could have accurred without its being known outside of Rome, and still further could be utterly forgotten for fifteen centuries. Again, if Hippolytus had headed a party so inimical to the authority of the bishop, how comes it that his name has of the hishop, how comes it that his name has descended without a stain as that of a saint and a markyr? Dr Salmon suggests the explanation that Hippolytus may have been the head of the Cheek Christians at Rome, and that as such he may have been specially entrusted with some episcopal functions—an anomalous state of matters which would come to an end with the necessity His attacks on Callistus were written in for it. Greek for Greek-peaking people, hence the faintness of the impression they made upon the Latin world; while at the same time most of the recollections of the earlier part of the century were lost in the severity of persecution under Decius and Valenian. At any rate the state of the controversy shows that in the 3d century Christians elsewhere than at Rome itself were not much interested in the question who was Bishop of Rome at all. Hippothe least to have been bitter and prejudiced as a controversialist. The ecclesiastical charges brought against Callistus in this famous treatise are his giving easy absolution to sinners excom-municated by Hippolytus and others, admitting digamists and trigamists to the ranks of the clergy, allowing the elergy to marry, and permitting Cluistian ladies to contract illegal marriages with men of inferior social rank.
The date of Hippolytus and his importance

among his contemporaries are proved further by the statue of him discovered at Rome, on which is engraved the sixteen years' cycle which he invented to find the time of Easter. This cycle is an erroneous one, the error being of such a nature as could not fail to be discovered after a dozen years, hence it follows that the statue in his honour inust have been inscribed before that discovery occurred, about 240 A.D.

occurred, about 240 A.D.

The extant writings of Hippolytus were first collected by Fabricius (2 vols. Hamburg, 1716–18), and have since been printed in vol. ii. of Galland, Bibl. Vet. Pat., and vol. x. of Migne's Patr. Gr. The most accessible edition is that of Lagarde (1858). English translations of the Refutation, as well as the other extant works and fragments, may be found in Claik's 'Ante-Nicene Christian Library.' Bishop Lightfoot thought it more than probable Hippolytus was the author of the famous Muratorian Canon, as there was no other man at that time at Rome capable of writing it.

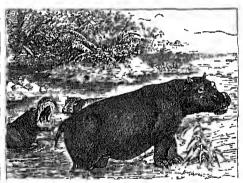
See Bunsen, Hippolytus and his Age (1852; 2d ed.

See Bunsen, Hippolytus and his Age (1852; 2d ed. 1854); Christopher Wordsworth, St Hippolytus and the Church of Rome (1853; 2d ed. 1880); Dollinger, Hippo-254

lytus and Kallivius (1853; Eng. trans. by Plummer, 1876); Volkmar, Hippolytus u die Romische Zeitgenossen (1855); Lipsius, Zur Quellen-kritik des Epiphanios (1865), also Die Quellen der altesten Ketzeigeschichte (1875); and Harnack, Zur Quellen-kritik der Geschichte des Gnostizismus (1873-74).

Hippophagy. Hippophagi (Gr., 'eaters of house-flesh') was a name given by the Greeks to a Seythian people, living north-east of the Caspian Sea, and to a Sarmatian tribe north of the Enxine. In some parts of modern Europe house-flesh is a regular and whole-ome article of diet. In France a society of hippophagists was formed under the auspices of Geoffroy St Hilaire; in 1866 the sale of horse-flesh in the Paris markets as an article of food was officially recognised and regulated; and during the siege of Paris horse-flesh was gladly eaten by all who could get it. Ponltry are in some places fed on the flesh of old horses. In Great Britain an act was passed in 1889 regulating the sale of horseflesh, requiring that all horse-flesh (or flesh of asses and nules) exposed for sale shall be expressly so described in legible and conspicuous characters, and imposing a penalty of £20 on any one who breaks this rule, or who gives any one horse-flesh who has asked for meat other than horse-flesh.

Hippopotamus (Gr., 'river-hoise'), a genus of autiolactyle ungulate manimals, constituting a family by itself. Till of late only one species was known as now existing, although the fossil remains of others indicate the greater abundance and wider distribution of the form in other periods of the earth's history. The largest and hest-known species, H. amphibaus, is—or, within historic periods, has been—found in almost all parts of Africa, to which



Hippopotamus amphibius,

quarter of the globe it is entirely confined. A smaller species, *H. liberiensis* (distinguished by some as a distinct genus, Chresopsis), was described in 1844 as an inhabitant of the rivers of western Africa within the tropics, and differs from the common species, and from all the fossil species, in common species, and from all the lossif species, in baving only two incisors, instead of four, in the lower jaw. But as the missing teeth occasionally exist there seems no valid leason for separating this form generically. The common hippopotamus is one of the largest of existing quadripeds, the bulk of its body being little inferior to that of the elephant, although its legs are so short that its belly almost topology the ground and its beight in belly almost touches the ground, and its height is not much above five feet. It is extremely aquatic in its habits, living mostly in lakes or rivers, often in tidal estuaries (where the saltness of the water compels it to resort to springs for the purpose of drinking), and sometimes even in the sea, although it never proceeds to any considerable distance from the shore. Its skin is very thick—on the back and sides more than two inches; it is dark brown

(albino and piebald individuals have been seen), destitute of hair, and exudes a reddish fluid, which has been said to have given rise to the legends of sweating blood. The tail is short. The feet have each four toes, nearly equal in size, and hoofed. The neck is short and thick. The head is very large, with small cars, and small eyes placed high, so that they are easily raised above water, without much of the animal being exposed to view. The muzzle is very large, rounded, and tumid, with large nostrils and great lips concealing the large front teeth. The hippopotamus cuts gruss or corn as if it were done with a seythe, or bites with its strong teeth a stem of considerable thickness neatly through. The skull, while it is distinguished by remarkable peculiarities, corresponds in the most important characters with that of the hog. The respiration of the hippopolamus is slow, and thus it is enabled to spend much of its time under water, only coming to the surface at intervals to breathe. It swims and dives with great ease, and often walks along the bottom, completely under water. Its food consists chiefly of the plants which grow in shallow waters and about the margins of lakes and rivers; and it probably renders no unimportant service in preventing slow streams from being choked up by the luxuriance of tropical vegetation, the effect of which would, of course, be an increase of the extent of swampy land. It often, however, leaves the water, chiefly by night, to feed on the banks, and makes invoads on cultivated fields, devouring and makes invoads on cultivated fields, devouring and trampling the crops. It is a gregarious animal; and the havoe wrought by a herd of twenty or thirty is very great, so that wherever cultivation extends war is waged against the hippopotanus, and it disappears from regions where it formerly abounded. Thus it is no longer found in Lower Egypt, although still abundant farther up the Nile. It is taken in pits, which are digged in its usual tracks; it is killed by poisoned spears, is pursued by means of canoes, is harpooned, and is shot. The flesh is highly esteemed; the fat, of which there is a thick layer immediately under the skin, is a favourite African delicacy, and when salted is known at the Cape of Good Hope as Zee-koe speck ('Lake-cow bacon'). The tongue and the jelly made from the feet are also much prized. The hide is used for a variety of purposes; and the great canine teeth, which sometimes weigh 8 or even 12 lb., are particularly valuable as ivory, 8 or even 12 lb., are particularly valuable as ivory, and are a very considerable article of African eommerce.

The hippopotanus is lively and playful in its native waters; it soon learns to avoid man; and, when it cannot retire among reeds for concealment, it dives and remains long under water, raising only its nose to the surface when another breath becomes necessary. The female may semetimes be The female may semetimes be becomes recessary. The remain may semecimes be seen swimming with her young one on her back. The hippopotamus is generally inollensive, but is occasionally roused to fits of rage, in which it becomes extremely dangerous, particularly to those who pursue it in heats. The voice is loud and harsh, and is likened by Burckhardt to the creaking and groaning of a large wooden door. That the and groaning of a large wooden door. animal is capable of being tamed, and of becoming much attached to man, has been sufficiently proved by the instances of living specimens in London and Paris. The first specimen brought to Europe in modern times, a young one from the Nile, arrived in London in 1850. The hippopotamus, however, sometimes appeared in the spectacles of the ancient Romans. It is very generally supposed to be the

Fossil Species.—A number of species of hippopotanns have been described from the later Tertiary strata; but in those times the distribution was not, as it is now, limited to the African con-

Behemoth of the book of Job.

Their remains have been found in India tinent and Madagasear as well as Europe. They occur in fresh-water marls, and in the bene caves, into which they had been carried for food by the carnivorous animals that used the caves as dens, One species found in England and in considerable abundance in the southern countries of Europe was of a size as much greater than the living species as its companion, the manmoth, was greater than the living dephant.

Hippuric Acid, C,H,NO, is a compound of great interest both to the chemist and to the physiologist. It derives its name from its having been first discovered in the unine of the borse, and that fluid, or the renal secretion of the cow, affords us the best and readiest means of obtaining it. The crystals of hippuric acid are moderately large, colourless, but subsequently becoming milk-white, four-sided prisms, which are devoid of odom, but have a faintly bitter taste. They dissolve readily in boiling water and in spirit, but are only sparingly soluble in cold water and in ether. It is an abmulant normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, &c., and most probably is to be found in the mine of all vegetable feeders. In the human mine of healthy persons living on an ordinary naised diet it occurs in very small quantity, but it is increased by an exclusively vegetable diet, and in the wellknown disease diabetes.

The hipparic acid occurring in the animal organism exists in combination with bases, and chiefly as hippurate of soda and hippurate of lime. named salt can be obtained by the more evapora-tion of the urine of the horse. The chief interest of the substance is that it was one of the first to be discovered of a long series of complex bodies, which we now know are formed synthetically in the animal body. Hippuric acid readily splits into benzoic acid and glycocoll. If benzoic acid is administered it is exercted as hippuric acid, combining with glycocoll in the body. In herbivorous animals the henzote acid is largely derived from the food; in animal feeders even in starvation it occurs in small amount in the nrine, and we must therefore conclude that its foreruners may be derived from the metabolism of the tissues. That certain bodies closely allied to benzoic acid may be so formed has now been experimentally demonstrated, while glycocoll can also be proved to be so produced. At one time the helief was entertained that these bodies were combined in the liver; but more recent research has shown that the synthesis chiefly takes place in the kidneys.

Hippurites, a very remarkable genus of fossil bivalves, peculiar to the Cretaecons strata, and so abundant in some of the Lower Chalk beds of the

Pyrenees and other places that the series has received from some continental geologists the name of Hippurite Limestone. The external form of the shell is so anomalous that the genns has been tossed about by naturalists in an extraordinary manner; some having called it a coral, others an annelid, others a harnacle, and so on, though the majority held it to be at least a molline. The investigations of S. P. Woodward that the Mountain and the state of th showed that the Hippurites were divergent bivalves. The right valve is very large, and elongated into a cone, while the left valve is inconspicuous, often A Hippurite.

like a lid, and perforated by radiating canals. Including allied genera or sub-genera—e.g. Radiolites and Caprinella—there are over a



723

hundred species, all restricted to the Chalk and Chalk-marl.

The contract of hiring, called in the Hiring. The contract of hiring, called in the law of England bailment for hire, and in that of Scotland location, is of two kinds—the hiring of things, as where household furniture is let to be nsed in the ordinary way; and the biring of work, as where a tailor's labour is bired to make a suit of clothes. In hiring of the first kind, hiring of things, it is the duty of the person letting out the thing to deliver it to the hirer, to refrain from in-terfering with the hirer's use of the thing during the subsistence of the contract, to do nothing to deprive the hirer of the use, to warrant that the thing hired is fit for the use for which it is let, and to keep the thing free from faults and defects inconsistent with the proper use of it, and in suitable order and repair. The hirer acquires no right of property in the thing hired, but acquires its possession and the exclusive right to its use for the period of the agreement. He has to use the thing well and with care, not to put it to any other use than that for which it is let, to restore it at the expiry of the time agreed on, and to pay the stipulated hire. The contract of hiring is a different agreement from those made under what is known to traders as the 'hire-purchase' system, as where a piano is handed over by its owners to a purchaser under the conditions that a certain sum shall be paid periodically as hire, and that after a certain number of such periodical payments have been made the piano shall become the property of the person making the payment. No such contract as one of 'hire-pur-chase' is recognised by law; and in the cases which have come before the courts under this system the question always is whether the contract, whatever it may be called by the parties, is legally a contract of hiring or a contract of sale. The answer will depend upon the particular terms of each agree-ment. These, however, are usually so framed as to make the contract, not one of hiring, but one of sale with a suspensive condition that the thing delivered shall not become the property of the person to whom it is sold until he has paid the full number of periodical payments bargained for. These payments, though they may be called hire by the parties to such an agreement, are legally only so many instalments of the price of a thing sold. A piano or other article delivered under such an agreement does not become the property of the holder until all these instalments are paid; and it cannot be attached by the creditors of the holder as an asset in his estate. Nor can it be lawfully sold by the holder. It remains the property of the person letting it out, and he can recover it even from one who has purchased it in good faith from the person by whom it was hired. Hiring of the second kind above mentioned, hiring of work, may be subdivided into (a) the lire of services, as where a shoemaker is employed to mend shoes; (b) the hiring of care in enstody, as where warehousemen or wharingers are employed to store things; and (c) the hiring of the carriage of goods. In cases of the first kind the workman is bound to do the work agreed on, to do it at the time agreed on, to do it well, and to use an appropriate degree of care in performing the particular task. Employees in the last two classes are bound to take ordinary care of the goods entrusted to them, and are responsible for damage done by their negligence. See also LANDLORD AND TENANT, INN, MASTER AND SERVANT, CARRIER, &c.

Hirschberg, a manufacturing town of Prussian Silesia, is romantically situated at the influx of the Zacken to the Bober, 1116 feet above sea-level, and 78 miles WSW. of Breslan by rail. It is the centre of the extensive textile, lace, paper, and

other manufactures of the district. Pop. (1875) 12,970; (1885) 15,622.

Hispania. Sce Spain.

Hispan'iola ('Little Spain'). See DOMINICAN REPUBLIC and HAYTI.

Hissar, a province of Bokhara, from which it is separated by a southern offset of the western prolongation of the Thian-Shan Mountains. This range forms its northern boundary. The country consists of a series of valleys, radiating from this mountainous background, and lying open on the south, traversed by streams which flow in general south or south-west to join the Oxus or Amu-Daila. The soil is fertile, and yields wheat, flax, cotton, rice, and garden fruits. Copper and rock-salt abound. The inhabitants (number not exactly known) are chiefly Ushigs and Tajiks. They export corn, salt, flax, and sheep to Bokhara. The main route from India to Bokhara passes through the province; and Hissar has its chief access with Bokhara, 230 miles to the north-west, through a celebrated pass called Kohluga or the Iron Gate. The province was annexed by the emir of Bokhara in 1869. The capital is the town of Hissar, with 15,000 inhabitants, on the Kafimihan River. Its people are noted sword-makers.

Hissar, the capital of a district of that name in the Punjab, on the Western Junna Canal, 102 miles W. of Delhi. Pop. 14,167. The district of Hissar, lying on the western verge of the Bikanir desert, has an area of 3540 sq. m., and its fertile soil produces tice, millet, barley, grain, wheat, &c.; but the crops are entirely dependent upon the rainfall. Pop. (1881) 504,183. Area of Hissar division, 8355 sq. m.; pop. (1881) 1,311,067.

Hissarlik. See Troy.

Histology (derived from the Greek words histor, 'a web or texture,' and logos, 'a discourse') is the science which classifies and describes the structural or morphological elements which exist in the solids and fluids of organised bodies. It is identical or nearly so with general minute anatomy and with microscopic anatomy. Although its origin may be traced to the times of Malpighi (1628-94), who discovered the blood-corpuseles, and of Leenwenhoek (1632-1723), who, with comparatively imperfect optical means, added much to our knowledge of the minute structure of the tissues, it never made any definite progress till the second decennium of the 19th century, when the compound microscope began to assume its present improved form. It was by means of this microscopico-chemical examination that the structure of the different horny tissues was first clearly exhibited, and it was thus proved that nails, cow's horn, and whalehone are similarly composed of aggregations of individual cells. Again, in the investigation of the nervous tissue, and of many other structures, chemistry and the microscope have been most usefully combined.

Of late no department of medical science has made such rapid progress as histology. In Germany it has been successfully entitivated by Schwann, Henle, Valentin, Remak, Kölliker, Virehow, Leydig, Frey, and a host of others searcely less distinguished; in Holland it has heen actively prosecuted by Donders, Harting, and others; Lebert, Mandl, Robin, and others have contributed to the French literature of the subject; while in Britain the names of Todd and Bowman, of Goodsir, Quekett, Benuctt, Sharpey, Clarke, Wharton Jones, Beale, and Huxley deserve honourable notice.

Hit (ane. Is), a town of Turkey in Asia, on the Euphrates, 85 miles WNW. of Bagdad, has pits of bitumen, which have been worked from time immemorial, and naphtha-springs. Pop. about 2500.

Hitchcock, Edward, geologist, horn at Deerfield, Massachusetts, May 24, 1793, was successively Congregational pastor in Conway, Massachusetts (1821–25), professor of Chemistry and Natural History (1825–45) and of Natural Theology and Geology (1845–64) in Amherst College, of which he was also president from 1845 to 1854. He died on 27th February 1864. He was state geologist of Massachusetts in 1830–44, and of Vermout in 1857–61, and published very full reports, as well as a volume (and supplement) on the Ichnology of New England (1858–65). In 1850 he was commissioned by the state to visit and examine the chief agricultural schools of Europe (Report, 1851). But he chiefly distinguished himself in the geological department of natural theology, writing The Religion of Geology and its connected Sciences (1851), which had a very wide circulation on both sides of the Atlantic. His Elemantary Geology (1840) was also popular both in America and in England. Hitchcock took an active part in founding the American Association of Geologists and Naturalists, and was its first president in 1840. He was also one of the foundation members of the National Academy of Sciences (1863).

Mitchin, a thriving market-town of Hertfordshire, on the Hiz, through the Ivel a feeder of the Ouse, 32 miles NNW. of London. An important railway junction, it has a fine ald parish church, a modern town-hall, a free school (1622), a Friends' school, &c. The principal trade is in corn, malt, and flour; there are several large breweries; and many females are employed in straw-plaiting. Lavender has been grown here since 1568, and commercially, for lavendor water, since 1823. Hitchin was a place of some consequence in the days of King Alfred. It was the original seat of Girton College (q.v.). Pop. (1851) 5258; (1881) 8434.

Mitopade'sa (lit. 'salutary counsel'), a famous collection of fables and stories in Sanskrit literature, asually ascribed to the compilation of the Brahman Vishunsarman. It is a popular summary in four books of the larger work, the famous Panchatantra, which directly and indirectly has been the source whence a rich stream of falk-tales has flowed westwards over Europe. An edition of the text, with an English translation, was published by F. Johnson in 1864; a French translation by E. Lancereau in 1882.

Mitteren, an island off the west coast of Norway; area, 203 sq. m. Pop. 2700.

Hittites, the English name of a people who waged war with Egypt and Assyria for a thousand years, and who moved on parallel lines with the people of Israel from the call of Abraham to the Captivity. The Hittites have scarcely any record in classical history, but in late years we have much information respecting them from various sources.

orderivity. The interest has scarted any content of classical history, but in late years we have much information respecting them from various sources. First in order and importance are the nearatives of the Old Testament. When the Semitic tribe with Abraham at their head moved from Haran to Camaan the Hittites inhabited the land (Gen. xv. 20), and fifty years later Abraham, a wandering sheikh, purchased a grave for his wife from the Hittites, who were then in possession and power at Hebron (Gen. xxiii. 4). The patriarch's family continued to live side by side with the Hittites; and Esan, the bedach, the grandson of Abraham, married two Hittite wives, who 'were a grief of mind unto Isaac and te Rebekah' (Gen. xxvi. 35). During the sojourn in Egypt the Israelites had the promise of occupying the land of the Hittites oft repeated, and from the bush on Horeb the promise was again renewed to bring them 'into the place of the Camaanites, and the Hittites, and the Amorites, and the Perizzites, and the Hivites, and the Jebusites' (Exod. iii. 8).

We now see that these peoples are mentioned in their topographical order as viewed from the Egyptian standpoint. The traveller northward from Egypt first came to Canaan, then he reached the Hittite colony in the neighbourhood of Hohron, and linally arrived at the Jebusites, who then inhabited Jebus, afterwards known as Jerusalem. After the exodus the spics found 'the Hittites, and the Jobusites, and the Amorites' dwelling in the mountains whither they had been driven by successive Egyptian invasions. The Hittites were conspicuous among those who opposed Joshna's entrance into the promised land, and the serried lines of Hittite chariots were scattered in confusion by Joshna's army in the decisive battle by Lake Merom. Hittite captains marshalled and led the bosts of David and Solomon, and Hittie badies were conspicuous in the harems of the same renowned monarchs (1 Kings, xi, 1). King David pushed his conquests and extended his border in 'the land of the Hittites' (the correct reading in 2 Sam. xxiv. 6 being not Tahtim-hodshi but 'Kedesh of the Hittites'); and, in the time of Jehoram, Benhadad of Dannasens fled headlong from Samaria with his Syrian horde when an alarm was raised that the Hittites were coming (2 Kings, xii.). The gaographical position generally of the Hittites in the time of Joshna was 'from the wilderness and this Lebanon, even unto the great river, the river the properties to the Hittites in the most important references to the Hittites in the Old Testament covers a period of a thousand years.

Next in importance is the testimony of the Egypthun and Assyrian inscriptions. In the Egyptian inscriptions the Hittites stand out as rivals of the Pharachs in peace and war from the 12th to the 20th dynasty. As soon as the key was found to the long silent records of Egypt and Assyria the veil began to lift off dark continents of history, and the forgotten but nighty Hittite people began to emerge; and now in the increasing light from Egypt and Assyria they stand before us in broad outline and in incidental detail. The two capitals of the Hittites were Kadesh on the Orontes and Carchenish on the Enphrates. The centre of their empire was in the north, but as an enterprising people they pushed a wedge-like colony down through Syria as far as Hebron and Egypt. According to Brugsch, the Hittites appeared on the Egyptian horder as early as the 12th dynasty. The capital of the Hyksos dynasty was Zoan or Tanais, and Mariette declares that one of the Hyksos dynastics was Hittite. In the Old Testament there is a curious statement that 'Hebron was built seven years before Zoan.' This casual statement now seems to indicate the order in which the Hittites consolidated their advance sonthward. The wave of invasion reached Hebron and made a ladgment there nine years before it swept over the border and made a lodgment in the land of Goshen. The discoveries at Tel-el-Amarna in 1887 throw additional light on the Hittites in Syria and Palestine, and a despatch written on a clay tablet, now at Berlin, contains an migent request from Egyptian assistance account of the Hittites. The marchine southwards.

against the Hittites, then marching southwards. Thothmes III. came to the throne about 1600 n.c. The monuments of his reign, one of which stands on the hanks of the Thames, are very manerous. In the hieroglyphies of Karnak there is a detailed account of thirteen campaigns waged by this Pharaoh against the Hittites. Great battles were fought at Megiddo, at Carehomish, at Kadesh, and elsewhere, and the Egyptian records boast of victories over the Hittites; but the Hittite resistance was not broken, and succeeding years saw

new Egyptian armies marching through the length of Syria against the hereditary foc. On the death of the great Thothmes the Hittites became more formidable, and after about fifty years of constant

Rameses I. and Sapiel the Hittite king.

Seti I. came to the throne two hundred years after the death of Thothmes III., and he at once marched against the Hittites as the 'avenger of broken treaties.' The details of this sanguinary campaign are depicted in the battle seene on the parts of the reset towards of the sanguinary. north side of the great temple of Karnak. At this period the Hittites were dominant in Syria, for one of the inscriptions declares that Syria was brought into subjection through Pharaoh's victory over the Hittites.

Ranceses II., the Pharaoh of the oppression, succeeded his father, Seti I., and carried on the war in many campaigns. Many temples are adorned with the records of his achievements, the chief of which was his famous hattle with the Hittites at Kadesh. Pentaur was present with the Pharaoh as war-correspondent, and he has recorded the events of the day in the world's most ancient epic. A copy of the epic adorns many temples in Egypt, and is written on a papyrns roll now in the British Museum. Kheta-sira had assembled his confederates and allies from many lands, even from Troy, and the battle ended in a draw, followed by an offensive and defensive treaty, and a dynastic alliance. Kheta-sira treats with the Pharaoh on equal terms, and his name stands first in the world's odlest treaty, which was written in Hittite on a silver plate, Egyptian translations of which have come down to us. Kheta-sira went down into Egypt with his eldest daughter, who became Pharaoh's queen, and thus inaugurated an era of peace.

Mineptah, the Pharaoh of the Exodus, loyally maintained the treaty, and 'sent wheat in ships to preserve the lives of the Hittites.' More than a hundred years later Rameses III. waged a cruel war in the land of the Hittites, and it is recorded on the temple of Medinet Abou that he brought back into captivity the king of the Hittites. We thus learn from the Egyptian inscriptions that the Hittites were rivals of the Egyptians from the 12th to the 20th dynasty. The shock of Egyptian invasion exhausted itself at Kadesh and Carchemish, but the centre of Hittite power lay beyond in the broad plains and highlands of Asia Minor, and so they had fresh armies and abundant wealth to enable them to with took they had be right to Ferrut for a them. them to withstand the might of Egypt for a thou-

sand years.

The Hittites occupy an important place in the Assyrian inscriptions. The reign of Sargon of Agade has been placed about the 19th century B.C.; and one date has been deciphered, which if correct would fix that reign about 3800 B.C. Even as early as the reign of Sargon I. the Hittites were a formidable power, and it has been supposed that in the time of the 19th dynasty in Egypt the Hittites occupied Mesopotamia. When we come to the cra of Tiglath pileser I., about 1130 B.C., the Hittites were paramount from the Euphrates to the Lebanon.
Tiglatin-pileser I. drove back the Hittites from his borders, and for a time made them tributaries, but they soon threw off the Assyrian yoke, and a desperate struggle for supremacy was waged for four hundred years between the empire of Assyria and that of the Hittites. The reign of Assur-nasir-pal (SS3-S58 B.C.) is largely a record of wars with the Hittites. His son, Shalmaneser, undertook thirty campaigns chiefly 'in the land of the Hittites.' The war continued to the close of the king's reign, and was carried on by the kings who succeeded him; and one hundred years later the Assyrians were still in deadly conflict with the Hittites.

The Hittites, who first appear in the Assyrian inscriptions in the reign of Sargon I., were destined to disappear from history in the reign of his name-sake. Sargon H. came to the throne in 721 B.C., and his first year was distinguished by the capture of Sanaria and the captivity of the Israclites, and four years later (717 B.C.) he brought the empire of the Hittites to a close by the defeat of Pisiri and the capture of Carchemish.

Thus ended the mighty empire of the Hittites, having maintained its existence, defying all enemies, longer than the empires of Babylon, or Assyria, or Greece, or Rome. The fact that the frontier towns of the Hittites had continued their resistance to the Assyrian arms, in almost yearly campaigns, throughout successive conturies, suggests that the Hittite empire must have been strong in resources beyond the frontier; and the mention of over 300 geographical Hittite names, in the inscriptions, shows how extended that dominion must have been,

In November 1872 the writer of this article succeeded in making casts of the famous Hanah (q.v.) inscriptions, which he declared to be Hittite remains. The theory, at first received with incredulity, is now admitted, and sculptures of the same character are now found to exist throughout the length and breadth of Asia Minor and northern Syria, from Hamah on the Orontes to Eynk by the Halys, and from Carchemish on the Euphrates to the Euxine and the Ægean. A beginning has been made in decipherment, but the first steps, though sure, are slow. There is no room for doubt as to their Hittite origin. The cunciform inscriptions were called Assyrian before Grotefend made the happy guess that led to their decipherment. The hieroglyphics were called Egyptian before Champollion and Birch began to miravel the mysteries of the Rosetta Stone; and it does not seem a violent supposition that the remarkable inscriptions 'in the land of the Hittites' may have been produced by the warlike but cultured people who once inhabited the land.

A set of llittle inscriptions and sculptures may be seen in The Empire of the Hittites, by Dr W. Wright (1884; 2d ed. 188i), as well as chapters on Hittite geography, art and learning, religion and nationality. Numerous payers by Professor Sayce on the Hittites have appeared in the publications of the Society of Biblical Archaeology, and a popular account by the same author has been published by the Religious Tract Society (1888).

Hitzig, FERDINAND, a German biblical scholar, was born 23d June 1807, at Haningen, in Baden, and educated at Heidelberg, Halle (where the influence of Gesenius determined him in favour of Old Testament studies), and Göttingen. In 1833 he was called to Zurich as professor of Theology, and in 1861 returned to fill the similar chair at Heidelberg. The first work which established his fame was his commentary on Isaiah (1833). Besides a translation of the Palms, with a commentary (1835-36), he furnished for the Exceptisches Handbuch zum A. T. the commentaries on the twelve minor prophets (1838; 4th ed. 1881), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), the Song of Solomon (1855), Proyerbs (1858), and Job (1875). This able and combative rationalistic critic is also Known by Die Erfindung des Alphabets (1840), Urgeschichte und Mythologie der Philistäer (1845), Geschichte des Volkes Israel (1869-70), &c., and by numerons contributions to the learned journals. He died at Heidelberg, 22d January 1875.

Hivites ('villagers' or 'midlanders'), a Canaanitish people, the main body of which lived in the region from Lebanon and Hermon to Hamath, but who had colonies, apparently isolated, in southern Palestine, as at Gibeon.

H'Lassa. See Lhassa. Ho. See HOANG-HO.

Hoadly, Benjamin, English prelato, was born at Westerhan, in Kent, November 14, 1676, and educated at Catherine Hall, Cambridge, of which he became tutor after taking his degree of M.A. Two years after that event he was chosen lecturer of St Mildred in the Poultry, London, and with this office two years later still combined that of rector of St Peter-le-Poer. Hoadly figures amongst the principal controversial writers of the 18th century, ranking amongst the 'rationalists, and defending the cause of civil and religious liberty against both the crown and the elergy. He carried on a controversy with Dr Atterbury on the extent of the obedience due to the civil power by occlesiastics in such a way as to scenre the appliance of the House of Commons. His Low Church principles made him an opponent of Sucheverell, whom he contended against in the pulpit. As a reward for his attitude in this matter, and for his zeal against the doctrine of non-resistance, be was made a bero of by the Wbigs. Through their instrumentality be was in 1710 presented to the rectory of Streathus in Surrey; and in 1715, when the accession of George I, had scenred the triumph of Whig principles, Houdly was made Bishop of Bangor. In 1717 he preached before the king a sermon on the text 'My kingdom is not of this world,' in which he endeavoured to show that Christ had not delegated his powers to any ecclesiastical authorities. Out of this originated the famous Bangorian Controversy, regarding which Hallam says that it was 'managed, porhaps on both sides, with all the chicanory of polenical writers, and is disgusting both from its tediousness and from the manifest, manifest, providing the state of the discount. and from the manifest unwillingness of the disputants to speak ingenuously what they meant. The controversy branched off into such a multi-The controversy braisined on into such a mutiplicity of side-issues, and produced such an extraordinary number of pamphlets (in July 1717 alone no loss than seventy-four appeared), that the main question became almost irrecoverably lost in a tangle of extraneous matter. The public excitement it created is said to have been so great that ment it created is said to have been so great that business in London was virtually at a standstill for some days. The dispute had, however, one important consequence—the indefinite prorogation of Convecation (q.v.). In 1721 Headly was transforred to the sec of Hereford, in 1723 to that of Salishury, and in 1734 to that of Winchester. He died at Chelsen, April 17, 1761. His Collected Works were published by his son in 1773, with Life prefixed. Life prefixed.

Hoang-ho ('Yellow River'), or simply Ho, one of the principal rivers of China, more than 3000 miles in length, rises in the plain of Odontala, south of the Knen-Lun Mountains, and has a tortuous course, described in the article China, Vol. HL pp. 184, 185. From the southernmost corner of the province of Chile-li, which it crosses, the Yellow River flowed until recently eastward to the ocean, 650 miles distant, in 34° lat; but in 1851–53 this wayward and turbulent stream, which is said to have shifted its course nine times in 2500 years, turned off near Kaibing-foo in a north-easterly direction. Since then it disclarges its waters into the Gulf of Pechili, some 500 unles north of its former mouth, the mountainous province of Shan-tung lying between the two. The river is little used for navigation, Chinese vessels being mable to stom its impetatous current. In some parts of its eastern course, as in the case of the Po, the river-bed is above the great plain through which it passes. The embankments requisite for averting inundations are a source of never-ending expense to the government, and their yielding te floods a frequent canso of dosolation to extensive districts of country. In 1887, by a dreadful inundation in Ho-nan, 'China's sorrow' destreyed millions of

lives. The measures subsequently taken by the Chineso government to regulate the course of the river proved futile. About 170 miles of the upper course of the Hoang-ho were explored for the hist time by Prejevalsky in 1880. The vast quantity of sediment conveyed to the sea by this river, giving it its colour and name, is taken up in that part of its course which lies between the provinces of Shan-hsî and Shen-hsî; beyond which its waters are remarkably clear.

Hoare, Sir Richard Colt, antiquary, was born at Stourhead, in Wiltshire, on 9th December 1758. The son of a banker, and after his accession to the baronetey in 1787 a gentleman of wealth, he devoted his leisure time to travel and antiquarian pursuits. The results of his labours in these departments appeared in a translation of Giraldus Cambrensis (1808), A Classical Tour through Italy and Sicily (1819), Ancient History of Wiltshire (1812-19), and Modern History of South Wiltshire (1822-44). He died at Stourhead, 19th May 1838. See Gentleman's Magazine, July 1838.

Hoar-frost. See Dew.

Hoarseness. See Throat (Diseases of).

Hoatzin. See Touraco,

Hobert (till 1881 known as Hobert Town), the capital of Tasmania, stands on the estnary of the Derwent, about 12 miles from its month, in the south of the island. The city forms nearly a square, bnilt on several bills, covering an area of about 1300 acres. A fine marine view may be obtained from Mount Pleasant. Besides Government House, the houses of parliament, and the government ollicial buildings, Hobert has a museum, library, two eathedrals, thirty-live churches, and is well supplied with schools, hospituls, and hotels. The hospital for the insane is at Cascade, 2 miles distant. The water-supply is derived from springs on Mount Wellington. The town is lighted with gas, and transways have been laid. The park known as the Queen's Donntin bas fine dives, and covers 1000 acres. In Franklin Gardens, in the centre of the town, are stutues to Sir J. Franklin, a former governor of Tusmania, and Dr Crowther. The fine natural harbour and quay accommodate ships of the largest size; and there are three first-class patent slips. The cooler and more invigorating air of Hobert attracts large numbers of summer visitors from Australia. The chief industries are the manufacture of flour and jam, tunning, and iron-founding. Hobert has railway communication with Lanneeston, 133 miles distant, and frequent steam communication with Melbourne (443 miles NW.) and Sydney, and ports in Now Zealand. Founded in 1804, the town was incorporated in 1857. The suburbs include New Town, Queenborough, Wellington, Glenorchy, Risdon, and Bellerive. About balf-n-dozen daily and weekly newspapers are published. Pop. (1871) 19,092; (1887) 26,004.

Hobart Pasha, the Hon. Augustus Charles Honart-Hampden, third son of the Earl of Buckinghamshire, was born at Waltham-on-the Wolds, in Leicestersbire, on 1st April 1822, and in 1836 entered the British navy. He first served against the slavors in Brazilian waters, then in the Baltic during the Crimean war, and there materially assisted in the capture of Bomarsund, in the attack on Abo, and in the bombardment of Sveåborg. Shortly after the conclusion of the war he retired on half-pay. On the outbreak of the civil war in America ho, as 'Captain Roborts,' took command of a blockade-runner, and several times got through the naval cordon that the North had established along the coasts of the Southern States, his adventures being most exciting and his escapes marvellous.

Lastly, he entered the service of Turkcy (1867), and for his great services in checking the Greek blockaderunners to Crete in that year was raised to the rank of pasha and made adminal of the Ottoman fleet. On the outbreak of the Russo-Turkish war (1878) he took command of the Turkish Black Sea fleet. After each of these last pieces of active service his name was struck off the British Admiralty list, but on each occasion subsequently restored. He died on 19th June 1886 at Milan. He wrote Sketches from My Life (edited by his widow, 1887), and a book entitled Never Canght (1867), giving an account of his exploits during the civil war in America.

Hobbema, Mendert, landscape-painter, born in 1638, probably at Amsterdam. Few particulars of his life are known. He is believed to have studied art under Jacob Ruysdael, whose name appears as a witness to his marriage at Amsterdam, 2d October 1668, to Eeltije Vinck, who predeceased him in 1704. He died in poverty, and was buried in the Westerkerkhof, Amsterdam, 14th December 1709. His art usually deals with quiet subjects of Dutch cottage and woodland scenery, and these are treated with a skill which entitles the artist to rank along with Ruysdacl at the very head of the landscape-painters of Holland. His works are subdued in tone, and finished with extreme care, yet with a singularly free and spirited touch, and are excellent in composition and lighting. Their figures were executed by Berchem, Adrian Vandevelde, and Lingelbach. Smith has catalogned 142 of his works, which now command very large prices, small landscapes from his hand having repeatedly fetched over £4000. Seven of his works are in the National Gallery, London, and of these 'The Avenue, Middelharnis, Holland,' formerly in the Peel and Vander Pot collections, is an exquisite example. See E. Michel, Hobbema et les Paysagistes de son Temps (1890).

Hobbes, Thomas, was born at Malmesbury on the 5th April 1588, and was the son of the vicar of Charlton and Westport adjoining that town. About the age of fifteen he was entered at Magdalen Hall, Oxford, where he was put through the usual course of Aristotelian logic and physics, His intellectual interests remained entirely unawakened, and long afterwards he attacked the universities in no measured terms for their familie to keep partial the time. At the age of twenty, having taken his degree and quitted Oxford, he was recommended to Lord Hardwick, afterwards Earl This are tutor to his eldest son. This no measured terms for their failure to keep pace of Devonshire, as tutor to his eldest son. was the beginning of an intimate connection with that great family, which lasted through his long life. In 1610 he went abroad with his pupil, and made the tour of France and Italy. After his return he still continued to live with the Cavendish After his family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Herbert of Cherbury, Ben Jonson, and other dis-tinguished men of the time. The first ambition to awake in him was that of the scholar, and he devoted his abundant leisure to a critical reading of the classical poets and historians. The outcome of the classical poets and instollans. The officence of these studies was his translation of Thucydides, which appeared in 1628, when he had already reached the mature age of forty. The Civil War was already looming in the distance, and in the choice of subject we may discern Hobbes's strong interest in politics—an interest which ultimately dominated his whole philosophy. The Earl of Devonshire died in 1626, and to Hobbes's great grief the second earl, his pupil, followed his father to the grave in 1628. Next were Heldes accounted to the grave in 1628. Next year Hobbes accepted an engagement as travelling tutor to the son of Sir Gervase Clifton, and in this capacity paid a second visit to the Continent; but in 1631 his

connection with the Devonshine family was resumed. By the desire of the dowager countess he undertook the education of the young earl, the son of his former pupil, then only thirteen. From 1634 to 1637 they travelled abroad, and on this occasion Hobbes came into contact with Galileo in Italy, while in Paris he was admitted to the scientific and philosophical circle of which Père Mersenne was the centre.

Since 1629, when chance introduced him to a copy of Euclid's Elements, he had been an adent student of geometry, and about the same time or a little later he began to be powerfully drawn to the new 'mechanical philosophy' of Galilco. In motion and the laws of motion he seemed to see a universal principle of explana-tion, and when he returned to England in 1637 it was with the outline of a comprehensive philosophical system already before his mind. Descartes, whose Discourse on Method appeared in that year, was also an adherent of the new physics, but limited and supplemented its explanations but thinted and supplemented his explanations by the subjective principle of self-consciousness. Hobbes did not occupy himself (except incidentally) with the philosophical question of knowledge, but contented himself with giving an objective explanation of sensation and all mental facts in terms of motion. Regarded as the object of science, terms of motion. Regarded as the object of science, the world consisted, in Hobber's view, of natural bodies (inanimate and animate) and political bodies, or organised aggregates of living men. Natural philosophy and civil philosophy therefore cover the whole ground; but, as the explanation of civil institutions is to be found in the nature of man, man stands out from among all other natural bodies, and forms as it were a bridge between bodies, and forms, as it were, a bridge between nature and society. Accordingly Hobbes planned three systematic treatises, De Corpore, De Homine, De Cire; but the pressure of political events prevented him from publishing his ideas in their natural sequence, and some parts of the scheme are much less fully worked out than others. On his return to England he continued to live with the young Earl of Devonshire, and was on intimate terms with Lord Falkland, Hyde, and others engaged in the political struggles of the time. The need of a political philosophy which would put an end to anarchy by a true theory of the governing power became every day clearer to him, and in 1640 he wrote 'a little treatise in English' in defence of the royal prerogative. This is preserved in MS, under the title of The Elements of Law, Natural and Politique, and is identical with the two treatises, Human Nature and De Corpore Politico, published separately ten years later. Fearful lest the Parliament should take notice of his treatise, Hobbes fied in the same year to Paris, which continued to be his home till 1651.

He was welcomed by his scientific friends, and Mersenne induced him to contribute to Descartes' Meditations a series of criticisms thereon. But the political needs of the time still lay nearest his heart, and in 1642 appeared the De Cive, a fuller statement of his theory of government. Very few copies of this edition were struck off, and the book appeared with a new title in 1647 as Elementa Philosophica de Cive. In 1650 appeared the two treatises already mentioned, and in 1651 he issued a vigorous English translation of the De Cive (Philosophical Rudiments concerning Government and Society) by way of introduction to the comprehensive English work on which he had been engaged for several years. Leviathan was printed in England, and appeared in the summer of 1651. Its rationalistic criticism and its uncompromising reduction of religion to a department of state mortally offended the royalist clergy of the exiled court. Hobbes had been mathematical tutor to

Prince Charles in 1647, and the latter always continued to take a friendly interest in bis old preceptor; but on the publication of Leviathan the author was informed that the young king refused to see him. With constitutional timidity he once more took refuge in flight. He returned to England in the end of 1651, and sent in his submission to the government of the Commonwealth, it heing one of the principles with which Leviathan concludes that an ordinary citizen has a right to turn to a new power that can give protection, however little he may approve of the circumstances of Hobbes settled in London to work out its origin. the remaining parts of his scheme. The De Corpore appeared in 1655, and the De Homine, a rather perfunctory revision of the old Human Nature (with expansion on the side of optical theory), in 1658. From 1654 anwards Hobbes was engaged in almost perpetual controversy, first with Bran-ball on liberty and necessity, and then with Ward, Wallis, and Boyle in defence of his own bopelessly indefensible mathematical ideas, which involved the quadrature of the circle and similar absurdities. The second controversy dragged over a quarter of a century, flobles's last blow being delivered after he had completed his minetieth year. After the Restoration Charles granted him a pension of £100, and is said to have been always delighted with the old man's wit and reparters, but the bishops and the church party looked with no favour upon the author of Leviathan. A series of attacks upon the book began to appear, and it was con-demined by the House of Commons in 1666. Three of his later works-Behomoth, The Common Laws, and a metrical Historia Evelesiastica, all written about 1670—he was obliged to leave impublished (though Hehemoth issued surreptitionally from the press just before his death). A collected edition of his Latin works in 1668 had to appear at Amsterdam. At the age of eighty-four Hobbes anneed himself by writing an autobiography in Latin verse, and within the next three years he completed a verse translation of the *Hiad* and the In 1675 he left London, and the rest of Odyssoy his days were spent at Hardwick and Chutsworth, the two Derbyshire seats of the Devonshire family. He died at Hardwick on the 4th December 1679, in

lis ninety-second year.

Hobbes stands between Bacan and Locke as the second in order of time of the great English philosophers, but he stands apart from both. It is by his contributions to scientific psychology, to ethics, and to political theory that he takes rank as an original thinker. In the present century attention has been drawn afresh to his acute psychological analyses by James Mill and the English association-His ethical theory, based on pure selfishness on the one hand and the arbitrary prescription of a sovereign power on the other, determined negatively the whole course of chical speculation in England for a hundred years. Comberland, Cadworth, and Clarke, and in a somowhat less degree Shaftesbury and Butler, are in the list instance critics and opponents of Hobbes. His political absolutism, however, is the most famous part of his speculations. The state of nature, he argues, is a state of war and inscentity (homo homini lupus). Moved by a desire to escape from the intolerable evils of such a condition, human beings enter into a species of contract by which they surrender their individual rights, and constitute a state under an absolute sovereignty. The sovereign power need not be monarchical (though Hobbes's individual preference is for that form of government), but, whatever form it assume, it is absolute and irresponsible. It was far from the intention of Hobbes to justify tyranny, but Leviathan was to him like 'a mortal god,' the only guarantee for security and settled government. The theory was substantially adopted by Spinoza; and, stripped of their accidental features, Hobbes's ethico-political ideas had great influence upon the philosophical Radicals of the 19th century. No account of Hobbes would be complete which omitted to mention his admirably clear and trenchant style, A collected edition of his works was published by Sir W. Molesworth in 16 vols, (1839–45). The best account of his life and his place in the history of thought is to be found in Professor Croom Robertson's Hobbes (Blackwood's 'Philosophical Classies,' 1886).

Hobby. Sec FALCON.

Hobhouse, John Cam, the friend of Byron, was born in 1786, and was educated at Westminster and Trinity College, Cambridge. His Journey through Albania with Lord Byron he published in 1813. An advanced Liberal in politics, he stood for Westminster in 1818 without success, but was returned by a large majority in 1820, and sat later for both Nottingham and Harwich. Successively Irish Secretary, First Commissioner of Woods and Forests, and President of the Board of Control, he succeeded to his father's baronetey in 1831, was created Baron Brongbton in 1851, and died without male heirs, 3d June 1869, when the pecuage became extinct, while the baronetcy passed to his nephew.

Ho'boken, a city in New Jersey, on the west bank of the Hudson River, adjacent to Jersey city, and opposite New York, with which it is connected by several steam-ferries. It is the terminus of the Delaware, Luckawanna, and Western Raihoad, and has a large shipping trade, especially in coal; iron-eastings and lead-pencils are among the pincipal mannfactures; and three lines of European steamships start from the port. The Stevens Institute of Technology here is one of the chief schools of its kind in the United States. Pop. (1880) 30,090; (1885) 37,721. The name of this city commemorates in the New World a village to the south-west of Antwerp, after which one of the new forts of Antwerp is named.

Hobson-Jobson, a term given by English soldiers in India to the Moharram festival; being a corruption of the Shitte cry (see Shires), Ya Hasan! Yu Hosain. The name was adopted for the Anglo-Indian glossary by Colonel Yule and Mr Burnell (1886).

Hoccleve, or Occleve, Thomas (probably so named from the village of Hocclough in Northumberland), an English poet of whom but little is known save that he was born about 1368, was a clerk in the Exchequer, and was writing verse so late as 1448. His chief work is a free, and it must be confessed tedious, version of the De Regimine Principum of Ægidins Romanus, over five thousand lines in length, and written in Chaucer's seven-line stanza. A prologue, about one-third of the whole in length, begins the work, and here the author tells us a good deal about himself and his troubles. The most interesting passage is that in which he speaks out his grief for the death of his great master Chancer, the 'floure of eloquence' and 'mirrour of fractuous entendement.' The poeum was edited by T. Wright for the Roxburghe Club in 1860. Many other poeus are ascribed to Hoccleve, some still unprinted. Some of these are stories from the Gesta Romanarum, as that of Jonathus, son of King Darius, and the wicked woman, which was modernised by W. Browne and printed in his Shepheards Pipe (1614), where he pays his original a most graceful poetical compliment for beyond his deserts. His Minor Poems and his Compleint have been edited by Dr Furnivall for the Early English Text Society.

Hoche, LAZARE, one of the most eminent generals of the French Republic, was born of poor parents, 25th June 1768, at Montreuil, a faubourg of Versailles. Enlisting at sixteen, he rapidly obtained promotion by his courage and capacity, and was given in 1793 the command of the army of the Moselle, for his defence of Dunkirk against the Duke of York. Here he tried to ent off the communication between the Prussians and Anstrians, and, although foiled by the superior forces of the Duke of Branswick, yet managed to drive the Austrians ont of Alsace. His next important service was putting an end to the civil war in La Vendée, which he accomplished with great prudence and moderation. He was appointed to command the troops in the unfortunate expedition for the conquest of Ireland (1796), but the ships were soon scattered by the storms. Soon after he was placed in command of the army of the Sambre and Mense. On the 18th April 1797 he crossed the Rhine at Neuwied, and had defeated the Austrians in several battles, when his career was stopped by the armistice concluded between the Archduke Charles and Bonaparte at Leoben. After the 18th Fructidor he was suddenly taken ill in the camp at Welzlar, and died, 18th September 1797. There are Lives by Rouselin (1798), Dourille (1844), Desprez (1858), and Dutemple (1879).

Hochclaga. See MONTREAL

Hockheim, a town of Prussia, in Hesse-Nassan, on the right hank of the Maine, 3 miles E. of Mainz. Here is produced the excellent white wine known as *Horhkeimer*, whence was derived, before 1625, the English name *Hork*, now applied loosely to almost any white Rhenish wine. Pop. 2804.

Mochkirch, or Hochkirchen, a village in Saxony, a few miles E. by S. from Hautzen, was the seene of a battle between the Austrians and Prussians (14th October 1758) during the Seven Years' War. Frederick II., with an army of 30,000 strong, was attacked under cover of a thick fog by Marshal Dann, with 65,000 Austrians, and compelled to retire to the heights of Drehsa. Frederick lost 9000 men killed and wounded and 101 cannon. He and most of his generals were wounded, and Marshal Keith and Prince Francis of Brunswick were killed. The Austrians lost 6000 men.

Höchstädt. See Blenheim. Hock. See Hochheim, Wine.

Hocktide, or Hoketide, a popular anniversary which used to be eelebrated on the Monday and Tresday following the second Sunday after Easter. On one day, generally on the Tresday, the women held the roads and streets, and stopped all men who came their way, and having bound them with cords, only set them at liberty after they had paid a small sum of money. On the other day the men had their turn, and collected from the women. The custom goes back to the 13th century, but became obsolete in the 18th. For a curious survival or reminiscence of the enstom still practised at Hungerford, in Berkshire, see Chambers's Journal, 1888.

Hodeida, a seaport of Yemen, in Arabia, situated on the Red Sea, whence are exported coffee, hides, eattle, fruits, and mother-of-pearl. Pop. about 20,000.

Hodge, Charles, an American theologian, was born in Philadelphia, 28th December 1797. He graduated at Princeton College in 1815, and in 1822 became a professor in the Princeton Theological Seminary, where he remained till the close of his life. He was founder and long the editor of the Princeton Review; and besides numerous essays, &c., he was the author of commen-

taries on Romans, Corintbians, and Ephesians, of a history of the Presbyterian Church in America (1840), and of the well-known Systematic Theology (3 vols. 1871-72), now a standard work of the Calvinistic churches. In 1872 he was presented with a sum of \$15,000, and a professorship bearing his name was founded in his honour. He died 19th June 1878. See Charles Hodge, by F. L. Patter (1889).—His son, Archibald Alexander (1823-86), succeeded his father at Princeton in 1878. He wrote Outlines of Theology (1860), works on the Atonement and the Confession of Faith, and a Life of his father (1880). His Popular Lectures were published in 1887.

Hodgkinson, Eaton, engineer, was born at Anderton, near Northwich, Cheshire, 26th February 1789. At the age of twenty-one he settled in Manchester. At this time the principal anthority on non beams was Tredgold, but his theories were overturned by Hodgkinson. Hodgkinson next made a series of 227 experiments on the strength of pillars, generally in conjunction with Sir William Fairbairn. In 1847 he was appointed professor of the Mechanics of Engineering in University College, London. For his important experiments and calculations, and general co-operation in the construction of the Britannia Bridge, he received a flist-class medal at Paris in 1855. His investigations are in general scattered through the Transactions of the British Association, and the Memoirs of the Manchester Society. Hodgkinson died 18th June 1861 near Manchester.

Hodograph (Gr. hodos, 'a way') of a moving particle is the curve passing through the extremities of those lines which, drawn from a fixed point as origin, represent in direction and magnitude the velocities of the particle at the different points of its path. It is a velocity diagram of a particular kind. Just as the tangent to the path at any point gives the dispatch of to the path at any point gives the direction of motion of the particle at that point, so the tangent to the hodograph at the corresponding point gives the direction in which the velocity is changing—i.e. the direction of the acceleration. Thus, if the hodograph is a straight line with origin anywhere outside it, we see that the acceleration is constant in direction, for a straight line is its own tangent Another conclusion at once deducible is that the velocity resolved perpendicular to the direction of the acceleration is always the same, direction of the acceleration is always the same, being given by the perpendicular from the origin upon the line. If, in this case, the acceleration is also constant in amount, we obtain the hodograph of the parabolic motion of a projectile. As another simple case, let the hodograph be a circle, centre the origin. Here the speed of the particle in its path must be constant; and further, the acceleration is perpendicular to the velocity, having the effect of changing the direction only of motion. If, in this case also, the acceleration is given as constant in amount, then the line representing the velocity in direction must rotate uniformly. Hence velocity in direction must rotate uniformly. Hence the path must be such that the angle between the tangents at two points must be proportional to the length of the arc joining them. In technical language, the path must be a plane curve of constant enrvature—i.e. either a straight line or a circle, obviously the latter in this case. Thus, under an acceleration constant in amount and always perpendicular to the direction of motion, and to a fixed direction in space, the particle will describe a circle with constant speed, the radius of the circle being a third proportional to the magnitude of the acceleration and the speed. The name hodograph was invented by Sir W. R. Hamilton, who made many elegant applications of its properties to dynamics. In virtue of the aberration of

light, every star describes a projection of the hodograph of the carth's motion in its orbit—i.e. the projection of a circle. The properties of the hodograph are treated in all modern treatises on the dynamics or kinematics of a particle.

Hodometer. See PEDOMETER.

Hodson, Major William Stephen Raikes, English soldier, usually known as Hodson of Hodson's Horse, was born at Maisemore Court, near Gloucester, on 19th March 1821. Choosing the life of a soldier, he joined the Indian army in 1845, and immediately got his first experience of warfaro in the battles of the first Sikh war. In 1847 he was appointed second in command of the Punjab corps of Unides, a body of irregular native troops raised for the protection of the north-west frontiers of India against the marauding hill-tribes. From 1849 to 1852 Hodson was employed in the work of civil government in the Phinidb. Then, being made commandant of the Guides corps, he did excellent service on the turbulent frontier. But in 1856 he was deprived of his command on account of irregularities in the regimental accounts and of his unjust treatment of the troops and natives under his authority. In the crisis of the Mutiny, however, he was appointed head of the intelligence department in the army engaged before Delhi, and was commissioned to raise a new regiment of irregular cavalry, which became known as Hodson's Horse. With this body of men Hodson took part in the siege of Dolln and in the subsequent operations down to the siege of Lucknow. After the fall of Delhi Hodson discovered the Mogul sovereign and his sons; those last he shot dead with his own hand at the time of capture. He himsoff was shot on 11th March 1858, during the assault on a royal palace in Lucknow, and died on the following day. As a leader of irregular native soldiery, Hodson won unqualified praise for his boldness and skill; his wild troopers were warmly attached to him. But he seems to have been of an imperious temper, which sometimes led him to commit acts of violence and injustice. In money matters he was certainly irregular; and he has been accused of 'looting' in

See Rev. C. Hodson's Hodson of Hodson's Horse (4th ed. 1883); and compare R. Bosworth Smith's Life of Lond Lawrence (especially appendix to vol. b.; 6th ed. 1885), and T. R. E. Holmer's Four Famous Soldiers (1889), though none of the three is absolutely satisfactory in his estimate of Hodson's character.

Hoeven, Jan van der, Dutch naturalist, was born on 9th February 1801, at Rotterdam. After studying medicine at Leyden, and zoology at Paris, he established himself as a physician in his native town; and in 1835 he was elected to the professorship of Zoology at Leyden. He died on 10th March 1868. His most important work is Handbock der Dierkunde (1827-33), of which a second edition, entirely recast, appeared in 1846, and an English translation by Clark, with important additions by the author and the editor, in 1856-58. Most of his other works are menoirs.—His brother, Cornells Privs van der Hoeven (1792-1871), was professor of Medicino in the university of Leyden (1824-71), and the author of De Historia Medicine (1842), De Historia Morborum (1846), and other important works on pathology and the history of medicine.

Hof, a town of Bavaria, on the Saale, 30 miles NE. of Baircuth, has extensive manufactures of ironwares, cottons, and woollens; cloth has been made here since the 15th century. There is a hospital, founded in 1262. Hof, almost entirely rebuilt since its destruction by fire in 1823, is closely associated with Jean Paul's earlier years. Pop. (1875) 18,267; (1885) 21,890.

Hofer, Andreas, the patriot leader of the Tyrolese in 1809, was born at St Leonhard, in the valley of Passeier, on 22d November 1767. For a century and a half his forefathers had been landlords of the inn 'Am Sand.' Although little higher in the social scale than a peasant, his force of character was such that, when in 1809 he summoned the people of the Tyrolese valleys to arms to drive out the French and the Bavarians, they responded with alacity and enthusiasm, eager to show their love for their emperor and the holy church. In seven weeks he twice defeated the Bavarians, twice expelled them from lumshnuck, and finally swept them clean out of the Tyrol. As the armistice concluded between Austria and France after the battle of Wagram left Tyrol and Vorarlberg out in the cold, the French again inundated their valleys with some 40,000 men. But again Hofer in eight days routed the foe and retook lumsbrack. For the next two months Hofer was the actual military governor and civil mier of his native land. By the peace of Vienna (October 14) the emperor of Austria again left Tyrol and Vorarlberg at the mercy of his enemies. Hofer, after some hesitation as to the wisdom of submission, once more took up arms; but this time the French and Bavarians were too strong for him. They steadily subdued one valley after another; and Hofer, seeing that the struggle was hopeless, disbanded his followers and took refuge in the mountains in the end of November 1809. But two months later his hiding-place was betrayed to the French, and Hofer was captured on 27th January, carried to Mantua, tried by court-martial, and shot on 20th February 1810. The 'Sandwirth' or 'landlord of the Sand' still lives in the memory of his people, and is the hero of many patriotic ballads. His statue, by Schaller, stands in Innsbruck.

See Hormayr, Das Land Tirol (1845); Egger, Geschichte Tirols, vol. iii. (1880); and memoirs by Weidinger (3d ed. 1861), Heigel (1874), and Stampfer (1874).

Mofimann, August Ilemrich, commonly called Hoffmann von Fallersleben, noted and philologist, was born 2d April 1798, at Fallersleben, in the district of Limeburg. At Gottingen and Bonn he accupied himself with philological and literary studies, especially the study of his native language and literature. From 1830 to 1838 he was keeper of the university library of Breslan, and professor of the German Language there from 1835. The publication of his Unpolitische Lieder (Unpolitical Lays) in 1842 cost him his professorship. For some years he led a wandering life in Germany, Switzerland, and Italy, until in 1860 he became librarian to the Duke of Ratibor at the eastle of Korvei, on the Weser, where he died on 19th January 1874. His principal philological and antiquarian works are Hore Belgica (1830-62), Reineke Vos (1834), Geschichte des Deutschen Kirchenlieds (1832; 3d ed. 1861), collections of ancient German Political (1843) and Social (1844) songs, Spenden zur Deutschen Literaturgeschichte (1844), Die Deutsche Philologie (1836), and Findlinge (1859-60). Hoffmann's own poetry often approaches good Volkslieder in its simplicity, tonderness, and playful bauter; and for these songs he produced unny admirable tunes. His political poetry contributed to the preparation of the political fermentation of 1848. The Gedirhte appeared in 1834 (8th ed. 1875), and he published numerous collections of songs, as Allemanusche Lieder, Soldatenteder, Kinderlieder, &c. He wrote an autolic graphy in 6 vols. (Mein Leben, 1868-70). See Wagner's Hoffmann von Fallersleben (1869-70), and Gottschall, Porträts, vol. v. (1876).

Hoffmann, Ernst Theodor Wilhelm, German writer, musical composer and critic, and

caricaturist, was born at Königsberg on 24th January 1776. (Later in life, to show his admiration of Mozart, he substituted for Wilhelm the name Amadeus.) Hoffmann qualified himself for a legal career, and in 1779 was appointed assessor in a court at Posen. But his irrestrainable love of caricature got him into trouble with his superiors, and he was degraded to an inferior post at Plock. Recovering ground again, for he was all his life long most exemplary in the discharge of his official duties, he was transferred to Waraw (1804); but the occupation of that city by the French two years later threw him entirely out of office. For the next ten years he led a very precarious existence, For the being often on the verge of want, yet always painting, composing music, and leading a wild and merry life. His great ideal was to live for and by art, especially music, and in 1808 he was for two months director of the theatre at Bamberg. ing these same years he wrote a remarkable essay on Mozart's Don Juan, and composed an opera on Fouque's Undine. In 1815 he was enabled to resume his career in the service of Prussia; and from 1816 down to his death in 1822 (25th June) he held a high position in the supreme court at Berliu,

His career as an author did not properly begin atil 1814. But his tales cannot be rightly ununtil 1814. derstood without some acquaintance with the strange personality of the writer—a little restless man, with a Roman nose and thin lips, and hawk-eyed, a brilliant talker, full of drollery and wit, vain, wayward, fantastic to an extreme, the child of impulse, and the bond-slave of his wild imagination. Educated on the dreams and ideals of German romanticism at the period of its most exaberant growth, he became himself the archpriest of ultra-German romanticism. At Posen, at Warsaw, at Bamberg, and in his last years at Berlin, he was the brilliant centre of the literary and artistic Boliemianism of the place. Amid the riot and icvelry at Posen he learned two of the lasting lessons of his lifetime, to wit, that company—annising company—and much rum were essential to his happiness. A fierce hater of dullness, Hoffmann waged incessant war upon the stiff-necked sticklers for routine and commonplace conventionalism, and upon the dilettanti who dealt so glibly in the phrasemongery of art-criticism. His wit constantly bubbled over in irony, ridicule, sarcasm, and was often both savage and malicious. His imagination was inexhaustible, but utterly undisciplined, wild, and fantastic, yet wonderfully vivid. Apart from music and painting, nothing fettered his interest so keenly as the extravagant and the marvellous, the grotesque, the weird, and the horrible. An impressionist above all things, Hoffmann's literary strength lies in his power of graphic and vivid description: he describes what he actually saw and felt, and he describes, as a painter paints pictures, in the spirit of concrete realism. He used to affirm that he did actually see the imps and hobgoblins and nightmare apparitions which his perferved imagination conjured up before him. In short, Hoffmann's tempesttossed soul was put in such jeopardy by his un-controllable imagination, conjoined with his lack of firm principle, that it barely escaped heing wrecked upon the rock of insanity.

His shorter tales, upon which his reputation as a writer mainly rests, were mostly published in the collections entitled *Phantasiasticke in Callot's Manier* (1814), Monisticke (1817), and Die Serapionsbrüder (1819-25). His longer works include Elixiere des Teufels (1816; Engtrans. 1824), Seltsame Leiden eines Theaterdirektors (1818), Klein Zuches (1819), and Lebensansichten des Kuters Murr (2 vols. 1821-22), this last being partly autobiographical. Of his fairy tales Der Goldene Topf

was translated by Carlyle (1827). Hoffmann's Austi-rable Schriften appeared in 10 vols, in 1827-28, the latest and the most complete edition of his Gesson melte Schriftin in 15 vols. in 1879-83. Collections of his tales have been translated into English in 1826 (Gillies), 1885, with biography (Bealby), and 1886 (Ewing). His writings, and translations and imitations of them, have been very popular in France. See Hitzig, Haffmana's Leben (1823); Funck's Echangrangen (1836); and Carlyle's Miscellaneous Essays, vol. i.

Hoffmann, FRIEDRICH, a German physician, was born at Halle, 19th February 1660, and died in that city, 12th November 1742. On the conclusion of his studies at Jena and Erfurt he commenced practice at Minden in Westphalia in 1685, but three years later removed to Halberstadt. In 1693 he was appointed to the professorship of Medicine in the newly-constituted university of Halle. He gained a European reputation as a practitioner, and was body physician to Frederick I. of Prussia. His medical theories are now for the most part antiquated, though some of his phannaceutical preparations, once highly esteemed, are still in use. The most important of his works, Medicina Rationalis Systematica (9 vols. 4to), was published in 1718-40. His Opera Omnia were printed at Geneva in 1740, in six folio volumes, with three supplementary volumes in 1753-60.

Hofhuf, one of the chief towns of the Arabian district of El-Hasa, situated a short distance inland, over against the islands of Bahreiu in the Persian It has a fortress, believed to have been built by the Carmathian princes. It has been in the hands of Turkey since 1872. Pop. 25,000.

Hofmann, August Wilhelm, chemist, was born at Giessen, 8th April 1818. After obtaining the degree of doctor of philosophy, he became assistant to Liebig in the laboratory at Giessen. When the Royal College of Chemistry was estab-lished in London in 1845 Hofmann was, on Liebig's lished in London in 1845 Hofmann was, on Liebig's recommendation, made superintendent of the new institution, since merged in the Rayal School of Mines; and from 1856 to 1865 he was chemist to the royal mint. In 1865 Hofmann accepted an appointment to be professor of Chemistry in the university of Berlin. His numerous contributions to the Annalen der Chemie, to the Transactions of the Chemical Society, and to the Philosophical Transactions of the Royal Society are for the most part on the very highest departments of organic chemistry; and in 1854 a royal medal was awarded to him for his Memors on the Molecular Constitution of the Organic Bases. It Molecular Constitution of the Organic Bases. It was in the course of these researches that from coal-products he obtained aniline (see ANILINE, DYEING), the basis of so many colours which had previously been only obtained from indigo; many of the aniline dyes we owe to him. He devoted much time and labour to the development of the theory of chemical types. Hofmann's Introduction much time and labour to the development of the theory of chemical types. Hofmann's Introduction to Modern Chemistry (1865; 7th ed. 1877), based on lectures delivered in London, led to great reforms in the teaching of chemistry. He wrote on The Life-work of Liebiy (1876), and, in German, on the work of the chemists Wöhler (1883) and Dumas (1885), as also Chemische Erinnerungen (Berlin, 1882). On Liebig's death he became editor of the Annalon der Chemie. He was weakled on his countried by the (1882). ennobled on his seventieth birthday (1888).

Hog. See BOAR (WILD), Pic. In Scotland a sheep that has not yet lost its first fleece is called

a Hog or Hogg; a sheep two years old is a Hogget.

Hogarth, William, a celebrated painter, engraver, and pictorial satirist, born in Bartholomew Glose, London, on the 10th November 1607, served his apprenticeship to a silversmith named Ellis Gamble, in Cranbourne Alley, Leicester Fields, and studied art at Sir James Thornhill's school in

James Street, Covent Garden. About 1720 he set up for himself. His first employment was to engrave enats of arms, crests, shop-bills, &c., after which he began to design plates for the hooksellers, the chief of which are the illustrations to Gray's edition of Hudibras (1726). He next tried his hand at portrait-painting, and soon bad ample employment for what are called 'conversation pieces,' but he never cared greatly for this branch of art. In March 1729 he married clandestinely the daughter of Sir James Thornbill, and shortly afterwards began to display Thornfull, and shortly afterwards began to display his extraordinary faculty for depicting the vices and follies of his time. In 1730-31 he painted 'A Harlot's Progress, a series of six pictures which, like many of his other works, was engraved by himself. It was published in April 1732. The 'Harlot's Progress' was followed by other moral histories and contributed by the contributed by the contributed was proposed to the contributed by the contri Conversation' (1734), 'Southwark Fair' (1735), 'A Rake's Progress' (1735), 'The Distressed Poet' (1736), 'The Four Times of the Day,' and the 'Strolling Actresses dressing in a Bun' (1738). Concurrently with these Hagarth made more than one attempt to compete with the popular bistory-painters of his day, and with far less success produced the large canvases still in St Bartholomew's Hospital—the 'Paal of Bethesda,' and the 'Good Samaritan, both excented in 1736; and the Asso produced several portraits. The series of graphic satires was, however, continued by the 'Euraged Musician' (1741) and the famous 'Marriage à la Made' (his musterpiece), six pictures now in the National Gallery, and engraved by various hands in 1745. 'Industry and Idloness,' twelve plates, followed these in 1747; 'Calais (late, or O the Roust Beef of Old England!' (1749) came next, and in 1750 the line plate known familiarly as the 'March to friehley.' The minor plates of 'Beer Street' and 'Gin Lane' and the set called 'The Progress of Cruelty belong to 1751. In 1752 he published the Analysis of Banty, a treatise containing many shrewd remarks, but confused and illiterate in its style. It had only a survey destine. After this he returned to his graver, producing (with the aid of Grignion and others the four prints of the 'Election Series' (1755-58), the 'Cockpit' (1759), and other pieces. In 1757 he was appointed sergeant-painter to the king. In 1762-63 an unhappy exension into politics involved bint in a miserable quarrel with Wilkes and Churchill, the result of which, an his side, was the well-known portraits of Wilkes, and of Churchill as a bear ('The Bruiser'). By this time his health was failing. He composed a tailpiece to his works, 'Finis, or the Bathos,' March 1764; and in October of the same year died at his house in Leicester fields. He was buried in Chi-wick churchyard, nuder an epitaph by Garrick. Not far off still stands the little villa which he

There are portraits of Hogarth by himself in the National and National Portrait Galleries, and most of his pictures, which now enjoy a much higher repute for technique than formerly, are preserved in public or private collections in Britain. His powers of invention and combination were extraordinary; and as a humorist and social satirist with the pencil he has never been surpassed. There can be no doubt also that he genuinely desired to assist by his work in the reformation of manners.

His prints can be studied in the collections of Boydell (1790), or of Buldwin and Cradook (1820-22). Biographical studies of him have been published by G. A. Sala (1866) and Austin Dobson (1889). The best commentaries on his engravings are to be found in John Iroland's Hoyarth Illustrated (1791-98); Lichtenberg's Ausführliche Erklürung (revised edition, 1850-53); Nichols and Stoevons' Genuine Works (1808-17); and F. G. Stephons' Catalogue of the Satirical Prints and Drawings in the British Museum, vols, ii.-iv.

Hogg, James, Scottish poet, was born, in a cottage near the parish church of Ethick, Selkinkshire, in the year 1770. The exact date of his birth is unknown; and rather singularly he himself asserted it to have been the 25th January 1772. It is heyond question, however, that he was baptised on 9th December 1770. He was the second son of Robert Hogg, farmer and shepherd, by Margaret Laidlaw, who was a distant relative of William or 'Willie' Laidlaw, the amanuensis of Sir Walter Seott and author of 'Lney's Flitting.' Hogg's education was conducted in a very irregular fashion, awing to his heing taken from school at intervals to help his father in tending sheep. His schooling, according to his active to help his father in tending sheep. amounted in all to about six mouths; he learned to read the Bible, but not to write. Meanwhile, however, his mother had filled his imagination by telling him 'tales of kings, giants, knights, failes, kelpies, brownies, &c.' In the intervals of work he seems to have educated himself, and when he was about sixteen years of age a perusal of The Gentle Shepherd and Life and Adventures of Sir William Wallace kindled his poetical funcy. Hagg himself says, however, that it was not till 1796 that he attempted to write verses, and 'for several years his compositions consisted wholly of several yours his compositions consisted wholly of songs and ballads, made up for the lasses to sing in chorns.' In 1800 one of his poems, 'Donald M'Danald,' having for its subject the threatened invasion of Great Britain by the list Napoleon, was published anonymously. The following year, having visited Edinburgh to sell his employer's sheep, be had printed in pumphlet form scottish. Pastorals, Poems, Songs, de. Of this small valume a thousand copies were thrown off, but value a thousand copies were thrown off, but no impression was made upon the imblie by it. At this time Hogg contemplated enigration to the island of Harris, and wrote a 'farewell to Ettrick.' His scheme fell through, but he was fortunate enough to make the acquaintance of Sir Walter Scott—then Mr Scott, sheriff of Schkirkshire. Having written out several ballads from his modher's recitation, he sent them to Scott. his mother's recitation, he sent them to Scott, who gave them a place in the third volume of his Border Minstrelsy, which appeared in 1803. same year Constable, acting on Scott's advice, published a volume of verse entitled The Mountain Bard, and also a treatise of a different kind entitled Hogg on Sheep. The two between them brought him 4300, which he sunk in a farm that proved a total failure. After several years of vicissitude, in which he tried, without years of vietistinde, in which he tried, without success, to run large stack farms, Hogg repaired to Edinhurgh and entered definitely on a literary career. He published in 1810 a second volume of poems, The Forest Minstret, which proved a failure, and started a weekly paper, The Spn, which lasted for a few months. Meanwhile he seems to have gone into business us a land-agent, but here again to have met with no success. In seems to have gone into business us a land-agent, but here again to have met with no success. In 1813, however, he published his greatest work, The Queen's Wake, and at once obtained cordial recognition from the critics, Jell'ey declaring in the Edinburgh Review that 'no doubt can be entertained that he is a poet in the highest acceptation of the term.' Hogg had made the friendship of Harriet, Duchess of Buccleuch, and in accordance with her death-had request her husband oranged him, on the payment of her hishand granted him, on the payment of a nominal rent, one of his farms known in-differently as Mossend, Eltrive Lake, or Altrive. Had he given himself up to this farm and to literature Hogg would probably have been a wellto-do as well as a happy man. But he hampered himself by taking the neighbouring farm of Mount Benger, and was more or less in pecuniary diffienlties to the end of his days. He was very bappy,

however, in his domestic life. In 1820 he married Margaret Phillips, the daughter of a tenant-farmer in Annandale, whom he had met at the house of her brother-in-law, Mr Gray, one of the teachers in the High School of Edinburgh. She proved an admirable wife, although she was some twenty years younger than her husband. Hogg now produced in rapid succession a number of works both in verse and prose. Of the former the chief are Mador of the Maor, The Pilgrims of the Sun, Queen Hynde, and the Border Gardand: of the latter The Brownie of Bodsbeck, Winter Evening Tales, The Three Perils of Man, and The Three Perils of Woman. It seems doubtful whether he was the sole anthor, or along with Lockhart the joint-author, of the remarkable Confessions of a Justified Sinner, otherwise known as The Private Memoirs and Confessions of a Fanatic, published in his name. Hogg was at this time a well-known figure in Edinburgh society; was the intimate friend of Professor Wilson, Sir Walter Scott, and Lockhart, although he had his differences with all three; wrote considerably for Blackwood's Magazine, and was the basis of the famons 'Shepherd' of the Nortes Ambrosiane. In the end of 1831 he paid a visit to London to arrange for the publication of a complete edition of his works. He remained for some weeks in the metropolis; was entertained to dinner by the Highland Society of London, and in other ways lionised. He died at Altrive, November 21, 1835.

was entertained to dinner by the Highland Society of London, and in other ways lionised. He died at Altrive, November 21, 1835.

Hogg once described himself to Scott as 'the king of the Momtain and Fairy School' of paetry, and this definition, egotistic though it is, holds good so far as Scotland is concerned. Of his musterpiece, 'Kilmeny, a leading critic of to-day, Mr George Saint-bury, has said that it is 'such poetry as, to take Hogg's contemporaries only, there is none in Rogers or Crabbe, little, I fear, in Southey, and not much in Moore.' Some of his ballads, such as 'The Witch of Fife,' and a few of his songs, especially 'When the Kye Comes Hame,' belong to the immortal part of Scottish if not of English literature. The late Professor Ferrier's description of Hogg as 'after Burns (proximus sed longo intervallo) the greatest poet that had ever spring from the bosom of the common people is now the universally accepted verdict of criticism. Hogg's prose is much more unequal than his poetry; a strong though coarsish humon is its

The chief authorities on the life of Hogg are his autobiography and Memorials of James Hogg, the Ettrick Shepherd, edited by his daughter, Mrs Garden (1885). Professor Wilson prefixed a short Memoir of Hogg to an edition of his works published after his death. The Memoir of the late Dr Robert Chambers by his brother, Dr William Chambers, throws an interesting light on Hogg's life in Edinburgh. Among recent criticisms of Hogg, that contributed by Mr George Saintsbury to Maonillan's Magazine for November 1889 deserves special attention.

Hogmanay, a name applied in Scotland to the last day of the year, the 31st of December, often celebrated with holiday festivities in connection with the New-year's Day. In the Scotland of former days it marked the commencement of a holiday of uproarious joviality, a kind of annual Saturnalia, in which the New Year was ushered in with the most boisterons revelry, accompanied by many quaint and time-honoured ceremonics. The origin of this name is altogether uncertain, and many idle ctymologies have been offered. These the curious will find in Chambers's Book of Days.

Hog-nnt. See Cob-nut.

most notable characteristic.

Hog Pium, a name given in the West Indies to the fruit of certain species of Spondias trees and shrubs of the natural order Anacardiaceee, also ealled Spanish Plum and Brazilian Plum. S. purpurca and S. lutea are the species generally called Hog Plum in the West Indies, because their finits are a common food of logs, which revel in their abundance. A nuch-e-teemed Brazilian dish is prepared of milk, curds, sugar, and the pulp of the fruit of S. tuberosa, from which also a refreshing beverage is made for use in fevers.

Hog-rat, or Hitla (Cupromys), a genus of porcupine-like rodents (Hystricomorpha) of the family Octodortida. The body is from 20 to 22 inches long, covered with long very haish fire, consisting of a mixture of black and yellow hairs; the tail is stont and rounded and slightly hairy, and is used for support in sitting erect or for aid in climbing trees. They are nocturnal or crepus-cular animals; their food is almost entirely vegetable. Three species are known, two inhabiting Cuba, and one Jamaica, where they are found in large numbers in the dense forests on trees or in thick nuderwood. The negroes use them for food, capturing them by snating or lunting them with dogs.

Hogshead, an old English measure of capacity, no longer in use, but equivalent for wine to 63 gallons, for ale and beer to 51 gallons. In the United States the word now signifies a large cask.

Hogue, Cape La. Sec La Hogue.

Hohenlinden, a village of 300 inhabitants in Upper Bavania, 20 miles E. of Munich, famous for the victory gained there by 70,000 French under Morean over 60,000 Austians under the Archduke John, 3d December 1800. Morean's army took up a position on the plateau between the Isar and the Inn, and the Austians on the right bank of the Inn. The Austrian main body advanced amidst drifting snow, and attacked the divisions of Grénier and Grouchy with the utmost fury; but, the French receiving considerable reinforcements under Ney, the assailants were driven back, and, heing attacked in the rear, were totally ronted. The victory was likewise decided at other points in favour of the French, who were only prevented frum pursuit by inclement weather, bad roads, and the short winter day. The Austrians and their Bavarian allies lost 17,000 men and 74 gams; the Brench had 5000 killed and wounded. Campbell's immortal lyric will keep the details of this battle from ever being forgotten. See Schleifer, Die Schlacht bei Hohenlinden (1885).

Hohenlohe, a former German principality in Franconia, now comprised chiefly in Würtemberg, partly also in Bavaria.

Hohenschwangau, a royal castle in Bavaria, 55 miles SW. of Munich, near the right bank of the Lech, and the southern frontier of the kingdom. It stands in a beautiful and romantic district, 2933 feet above sea-level. It was purchased in 1832 by the crown-prince Maximilian of Bavaria, who restored it in the style of a magnificent medieval fendal castle. The interior contains several superb halls decorated with frescoes and wall-paintings by eminent German artists. castle called Schwanstein occupied the same site as early as the 12th century; a second was erected in 1538-47; and the existing building is the third eastle. On another crag over against Hoben-sehwangan stands the castle of Neuschwanstein, which was built in 1869-71 on the site of the castle originally called Hohenschwangan by King Louis of Bavaria, in the Early Romanesque style. This castle too, a most magnificent and 'romantic' structure, contains superb wall-paintings, and displays the utmost splendour in its internal fittings. It was for some time the favourite residence of the recluse king, Louis II. Sec Zwickh, Herren-chiemsec und Neusehwanstein (1886).

Hohenstanten, a German princely house, members of which held the imperial throne from 1138 to 1254. The founder of the family was FREDERICK VON BUREN, who lived about the middle of the 11th century. His son Frederick assumed the name of Holenstanfen from a eastle assumed the name of Honometanten from a castle which he built on the hill of Staufen (2240 feet), 25 miles E. of Stottgart. He was invested with the duchy of Swabia by the Emperor Henry IV., and during the absence of the latter in Italy acted as vieegerent of the empire. Frederick, at his death in 1105, left two sons—Frederick II. the One-eyed, and Conrad. The former was confirmed in the death of Swabia and Italy the left the state of Swabia and Italy the latter of Swabia and Italy the left the state of Swabia and Italy the latter of Swabia and Italy the Italy of Swabia and Italy the Italy of Swabia and Italy the Italy of Swabia and Italy of Italy of Italy It in the duchy of Swabia; and in 1112 the latter received the duely of Franconia. After the death of Henry V. this emperor's family estates fell to the House of Unhenstanten; and Lothaire of Saxony was elected his successor in the empire. Lothaire revaked the grants made to the Hohenstanfens, and thus gave rise to a furious war, in which Frederick (his brother Canrad being absent in the Holy Land) had to encounter, single-handed, the whole power of the emperor, the House of Zähringen, and Henry the Proud, Duke of Bavaria and Saxony. After Courad's return fortune at first seemed to favour the brothers, but in 1135 they were compelled to submit and plead for the emperor's forgiveness. They were then put in possession of all their estates. Conrad, in 1138, was elected emperor of Germany as Conrad III. ivas elected emperor of Germany as Conrad III. The succeeding emperors of this family were Frederick I. (1152-90), Henry VI. (1190-97), Philip I. (1198-1208), Frederick II. (1212-50), and Conrad IV. (1250-54). Manfred, half-brother of the last named, lost his life in the battle of Benevento (1266), whilst asserting his rights to the throne of the Two Sicilies; and Conradin, son of Conrad IV., was put to death (1268) by Charles of Anjon for carrying on the struggle. See Raumer, Geschichte der Hohenstaufen (5th ed. 1878): GERMANY; and the articles on the several 1878); GERMANY; and the articles on the several emmerors.

Hohenstein, a Saxon town, with textile industries, 12 miles NE. of Zwiekau. Pop. 6827.

Hohenzollern, two united principalities (Hechingen and Sigmaringen) of south Germany, but belonging to Prassia, consist of a narrow strip of land entirely surrounded by Würtemberg and Baden. Area, 441 sq. un.; pop. (1885) 66,720, mostly Roman Catholies. The territory, whose surface is generally mountainous, stretches southeast from the Black Farest, across the Neckar and the Danube. The principal industries are agriculture and the rearing of cattle. Iron ore, gypsum, salt, and coal exist, as well as some mineral springs. The seat of government is Sigmaringen (4146).

The Hohenzollern family traces its descent from

The Rohenzellern family traces its descent from Count Thassilo, who lived about the beginning of the 9th century, and founded a castle near Heelingen, on the Zollern lill in the Swabian Alb, whence his descendants derived their patronymic. About 1165 the first separation took place, Frederick IV. founding the elder or Swabian and Conrad III. the younger or Franconian line. The elder line was subdivided, in 1576, into the branches of Heelingen and Sigmaringen. Frederick VI., the representative of the younger line, in 1415 received from the Emperor Sigismund the investiture of the electorate of Brandenburg, thus founding the reigning dynasty of Prussia. The two branches of the elder line continued unbroken till 1849, when the reigning princes ceded their respective rights and principalities to the king of Prussia, who agreed to pay them annual pensions. See GERMANY, Vol. V. p. 184.

Hoist. See LIFT.

Hokitika, the capital of Westland, New Zealand, and the chief town on the west coast, is the chief centre of a gold-producing district. It has breweries, sawmills, sash and door factories, and a tannery. Pop. 2687.

Holacanthus, a genus of fishes, in characters and distribution similar to the Chartodons (q.v.). They are remarkable for the great beauty and symmetry of their colours, and for their excellence as articles of food. The body is compressed, and the gill-cover hears a strong spine. One of the best known of the forty species, called Emperor of Japan by the Dutch, is H. imperator, one of the most esteemed fishes of the East Indies, rivalling the salmon in flavour. Its greatest size is about 15 inches long; its colour is deep blue, with numerous narrow bands of orange, the pectoral fins black, the tail bright yellow. In beauty it is rivalled by an allied species, H. diaranthus, of similar distribution.

If olbach, Paul Heinrich Dietrich, Baron D', philosopher, and one of the Freuch encyclopedists of the 18th century, was born of wealthy parentage, at Heidelsheim, in the Palatinate, in 1723. At an early age he went to Paris, where he continued to reside during the remainder of his life. He died 21st June 1789. As Holbach was remarkable for his agreeable social qualities, and kept a good table, the most eminent thinkers and writers of the day, such as Condorest, Diderot, Duclos, Helvétins, Raynal, Roussean, Bullon, &c., were in the habit of assembling at his house. The witty Abbé Galiani called Holbach the mattre d'hôtel of philosophy. Here speculation, it is said, was carried to such daving lengths that Buffon, D'Alembert, and Rousseau were compelled to withdraw from the circle. Holbach was the zealons champion of naturalism, and contended not only against Christianity, but against every positive religion. His principal work is the Système de la Nature (2 vols. 1770). In it the author endeavours to expound the natural principles of morality, and to investigate the aigin of the conflicting opinions on virtue and vice. He discusses the maxims of religions morality, and takes a rapid survey of social and savage life. He touches on the so-called 'social compact,' and in the course of his observations tries to prove, among other things, that self-interest is the ruling motive of man, and that Gad is only an ideal being, created by kings and pniests. The materialism of the French philosophes of the 18th century is nowhere more permicions and palty than in the writings of Holbach. It is but fair to state that his life was letter than his books. He was a man of good heart, and, in spite of his theories, of most unsellish benevolence. When the Jesnits fell into disgrace during the reign of Louis XV., Holbach, though he hated their system, and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered round them. See

Holbeach, a market-town of south Lincolnshire, 7½ miles by rail ENE, of Spalding. It has a fine Decorated church, with a spire 189 feet high; and Roman remains have been found here. Pop. of parish (1851) 5191; (1881) 5190.

Molbein, HANS, the younger, one of the most celebrated of painters, was born at Angsburg in 1494 or (moro likely) 1495, the son of Hans Habein the elder (c. 1460-1524), also a painter, and known by such works as 'The Basiliea of St Paul,' now in the Angsburg Gallery. He was instructed in art by his father, and his carrier efforts were influenced by the works of Hans Burgkmair, who, according to such authorities as Stetten, was

his maternal nucle. The first paintings that can with certainty be attributed to Holbein's hand are two panels of an altarpiece in the above-named collection. Various Madonna pictures which hear traces of the influence of the school of Menling, and a votive work in memory of Burgomaster Ulrich Schwartz, were painted in the immediately following years; but the finest of the artist's productions executed in Angsburg was the altarpiece for the monastery of St Catharine (1515-16), now in the Pinakothek, Munich, Renaissance architectural ornamentation of great heanty being skiffully introduced.

About 1516 Holbein was at work in Basel, lint he does not appear to have settled there till 1520, when he received the freedom of the city, and became a member of the guild Zum Himmel, which his elder brother Ambrosius, also a painter, had joined three years previously. During the interval he was painting in Zurich, and in Lucerne -where he decorated the interior and exterior of the residence of the mayor, Jacob von Hertenstein, with paintings now only known through drawings which were excented before the building was destroyed in 1824. It is possible that he also during this period made a brief visit to Milan; and the influence of the masters of northern Italy, especially of Mantegna and Leonardo da Vinci, can be traced in his subsequent productions. Among the more important works executed at Basel are the powerful portraits of the Burgo-master Jacob Meier and his wife; while the religious subjects of the period include eight seenes of the Davide points. of the Passion, painted upon a panel, ranked very highly by Woltmann, though Rumohr and Wormum are unable to regard them as Holbein's work, and the doors of the organ of Basel Cathedral, painted, upon canvas, with stately figures of saints and hishops. All these works are now in the Basel Museum. To 1522 is due one of the most important of the master's religious pictures, the Madonna and Child with St Ursus and St Martin of Tours (or perhaps St Nicholas), painted for the church of Reuchen, near Solothurn; and to about the same date is assigned the great work commissioned by that Jacob Meier whom Holbein had already painted, and representing the merchant with his wife and family kneeling before the Virgin and Child. The picture exists in two slightly-varying versions at Darmstadt and at Dresden, of which the former is the finer, and is now generally admitted to be the original. His mural decorations of 'The Peasants' Dance' and various classical subjects on the façades of a house in the Eisengasse, and those in the town-hall, are now known only through sketches and a few surviving fragments. He also executed noble portraits of Bonifacius Amerbach, professor at Basel, in the museum there; of Frobenius, the printer; and two distinct portraits of Erasmus and one of Melanchthon. Another interesting memorial of the intercourse between Erasmus and Holbein is a copy of the 'Praise of Folly,' published by Frobenius in 1514, in which the margins are enriched by a series of vigorous and humorous pen-sketches by Holbein. It is now

in the Basel Museum.

During his residence at Basel Holbein was largely employed upon designs for the wood-engravers, probably indeed it was mainly with a view to such work that he settled there. In addition to about twenty alphabets of richly ornamental letters, he designed over 300 woodents, including printers' devices, title-borders, and such general illustrations as those to Adam Petri's editions of Luther's New Testament (1522 and 1523), to Thomas Wohlf's issue of the same work (1523), and to Petri's edition of Luther's Old Testament (1523); as also the large single woodcuts of 'Christ bearing the

Cross' and 'The Resurrection,' and the two scarce subjects of 'The Sale of Indulgences' and 'The Trne Light,' which, like some other of his works, show the artist's warm sympathy with the Reformation. His most important woodcuts, however—the noble series of 'The Dance of Death' and the 'Old Testament Cuts'—though probably excented at this time, were not issued till a later period, the first editions of both being published at Lyons in 1538. It was formerly believed that Holbein was engraver as well as designer of the woodcuts associated with his name, but it is now generally conceded that he only designed and drew them.

In the end of 1526 or the beginning of 1527 Holbein visited England, when he was introduced by Erasums to Sir Thomas More, then in high favour with Henry VIII. He now began his great series of portraits of the most eniment Englishmen of his time, the studies for many of which exist in the eabinet of eighty-seven masterly drawings by his hand in the royal collection at Windsor. In various ways these drawings throw valuable light upon his methods of work; the fact, for instance, that many of them bear written notes of the coloms of their details proves that he was accustomed to execute his finished oil portraits from such charcoal and chalk sketches as these, and not directly from the life. Excellent antotype reproductions of these drawings have been issued by the South Kensington Department. Among the most notable of his oil portraits executed in England are 'Archbishop Walham,' of which versions exist at Lambeth Palace, in the Lonvre, and in the possession of Viscount Dillon; 'Sir Henry Guildford,' in the royal collection at Windsor; 'Nicholas Kratzer,' the king's astronomer, in the Lonvre; and 'The Family of Sir Thomas More,' now lost, but known through various copies and through the original sketch, now in the Basel Museum.

On his return to Basel (1529) Holbein painted

On his return to Basel (1529) Holbein painted the group of his wife and two children now in the museum there; and in the following year again took up his work in the conneil-hall, exceuting powerful mural subjects of 'Rehoboam,' 'Samuel and Sanl,' and 'Hezekiah,' works now destroyed. Probably in the beginning of 1532 he again visited London, whence a pressing invitation from the Basel conneil was ineffectual to withdraw him. At first he was much employed in London by the German merchants of the Hanscatic Lengue, many of whose portraits he executed. Sketches still remain for the decorations which he designed for these traders of the steelyard on the occasion of the marriage of the king to Anne Boleyn; which, with 'The Trinmphs of Riches and of Poverty,' were almost the only symbolical subjects executed at this period, to which are also due the great portrait group at Longford Castle known as 'The Ambassadors,' probably representing Sir Thomas Wyatt and John Leyland, the portraits of Thomas Cromwell, and the exquisite circular miniatures of Henry and Charles Brandon, sons of the Duke of Snffolk, in the royal collection at Windsor. He also executed many masterly designs for metal-work, and such drawings for the woodengravers as the title-pages of Coverdale's translation of the Bible (1535) and of Hall's Chronicles (1548). From a letter from the poet Bourdon to Solimar, dated 1536, we learn that Holbein at that time held the appointment of royal painter to Henry VIII.; and in this capacity he excented at Whitehall Palace a mural painting of the monarch and Queen Jane Seymour, with Henry VII. and Elizabeth of York, destroyed in the fire of 1698, of which a copy by Van Leemput exists at Hampton Court, while a portion of the original cartoon is at Hardwick Hall. This latter work and the large-sized miniature in the possession

of Earl Spencer are regarded by Woltmann as the only surviving anthentic portraits of the king from Hollein's hand among the many bearing his name. His delicate and exquisite portrait of Queen Jane Seymour is in the Belvedere, Vienna. To the same period is referable the admirable halflength of Sir Nicholas Carew, Master of the King's Horse, at Dalkeith Palace, and the noble portrait of Hubert Morett, the jeweller, formerly attributed

Holbein was repeatedly employed abroad on the king's service. In 1538 be was despatched to the court of the Netherlands to paint a likeness of Christina of Denmark, who had been proposed as Christina of Denmark, who had been proposed as a successor to Jane Seymour as queen to Henry VIII. In a three-hours' sitting he excented a sketch 'very perflight;' and fram this he produced the noblo full-length in the passession of the Duke of Narfolk. This work is one of the painter's choicest masterpieces, most attractive in the quietude of its execution and in its rendering of feminine sweetness and innocence. In the same year he appears to have been in Burgandy upon the king's business; and in July 1539 he was despatched to the court of Cleves, where he painted Anne of Cleves—'expressed her innaige verye lyvelye'—in a work now in the Louvre; while about 1540 he executed the striking portrait of the Duke of Norfolk, uncle of Queen Catharine Howard, of executed the striking portrait of the Duke of Norfolk, under of Queen Catharine Howard, of which the original is at Windsor, and an old capy is preserved at Arnudel Castle. The last work upon which Halhein was engaged was the picture of 'Henry VIII. granting a Charter to the Masters of the Barber-Surgeons Company, still preserved in their guildhall. It was left incomplete at the time of his death by the plagne, which, as the discovery of his will by Mr Black in 1861 has proved, occurred in London between 7th October and 29th November 1543, eleven years earlier than was previously believed.

Holbein is seen at his liighest in his partraiture; and in this department his expressional power, his veracity and dignity, and his nable technical qualities of uncerring draughtmanship, subtle and qualities of unerring grangitinuising, since and perfect modelling, and richness and force of colonring entitle him to rank with the greatest masters. It is his power as a portraitist that gives value and impressiveness to his religious subjects. He has little of the imaginative force, the visionary power, which stamps the works of an artist like Dürer; but his foot treads very firmly upon the coult and the focus and forms which he bestows earth, and the faces and forms which he bestows upon his sacred personages are full of homely truth, and a simple, moving pathos. As an ornanentalist he ranks as the equal of the greatest Italian masters, his work of this class being distinguished by easy seizure of form, great nobility of design, and the most exuberant richness of faney.

Many works by Holhein were included in the South Kensington Portrait Exhibition of 1866, in the Royal Academy Old Masters' Exhibition of 1880, and in the Tudor Exhibition of 1890; but in all of these exhibitions many portraits were quite erroneously attributed to his brush.

See Holbein and soine Zeit: des Kunstlers Familie, Leben, and Schaffen, by Alfred Woltmann (2d ed. Leip. 1874-76; English trans. of the first edition, by F. E. Bunnett, Lond, 1872); and Some Account of the Life and Works of Hans Holbein, by R. N. Wornum (Lond. 1807).

Holberg, Ludwig, Baron Holberg, the creator of modern Danish literature, was born at Bergen in Norway, 3d December 1684. He took his degree at Copenhagon, and spent some fourteen years partly as private intor and partly in travel, in the course of which he visited England (where he studied two years at Oxford), France, Italy, and Germany. In 1718 he was appointed professor of

Metaphysics at Copenhagen, but in 1720 exchanged that chair for the more incretive one of Eloquence. The works that laid the foundation of his fame The works that laid the foundation of his fame were satirical poems—first and foremost the serio-comic epic, written in iambics, of Peder Paws (1719-20), in which he ridicules the pedantic stiffness and stupidity of contemporary life and thought, and after this Hems Mikkelsen's Jesting Poems (1722) and Hems Mikkelsen's Metamorphoses (1726). But in 1721 the first Danish theatre was opened at Copenhagen, and Holberg tried bis hand at comedy-writing, with, as it turned out, marvellons success. His excellent light comedies, on account of their genuine wit, comic lumour, and skilful character-drawing, are counted by the and skifful character-drawing, are counted by the Danes amongst the best things in all their literature. They were published by their author in a collected form in 1723-25, and ngain, with five new plays added, in 1731-54. In 1730 Holberg became professor of History, and five years later rector of the university; and in 1747 he was emobled. He died at Copenhagen on 28th January 1754. Postage the west noticeable feature in Hel 1754. Perhaps the most noticeable feature in Holling's character is the versatility of his genins. After 1724 he again turned his pen to history, After 1724 he again turned his pen to history, and wrote, amongst other books, a History of Denmark, a General Church History, a History of the Jews, and Comparative Biographies of Great Men and Women, all greatly esteemed, put itenlarly the first. Then in 1741 he produced another classic of Danish literature, the satirice-humoristic runance Niels Klim's Subterranean Journey; and hastly he wrote serious vellective works, Moral Thomalis (1734) and Enistles (1748-54). His Auto-Thoughts (1744) and Epistles (1748-54). His Auto-biography (1727-43) should also be mentioned, Peder Paurs, the Subterranean Journey, and the Autobiography have been translated into English.

The best critical edition of his Comedies is that published by the Holberg Society in 8 vols. 1848-55 (new ed. 1884). See the monographs by Rahbek (1815-17), Werlanff (1838), Protz (1857), and G. Brandes (Holberg and seine Zeitgenossen, Berlin, 1885).

Molcroft, Thomas, playwright and novelist, was born in London, 10th December 1745 (o.s.). was norm in London, 10th December 1/45 (6,8). His father, in whom fondness alternated with fury, was by turns a shoemaker, horse-dealer, and pedlar; and he himself, after three years as a Newmarket stable-bay, then eight as shoemaker, schoolmaster, and servant-secretary to Granville Sbarne, in 1770 turned strolling player. He never was much of an actor, bost in low comedy and old pages, waster and ofter teithing in London (1777). men's parts; and, after settling in London (1777), he gradually took to authorship. Alwyn, or the Gentleman Comedian (1780), was the first of four novels; Duplicity (1781), af upwards of thirty plays. Of the latter, The Follies of a Day (1784), adapted from Beaumarchais' Mariage de Figuro, brought him more than £600; and The Road to Ruin (1792), he was a befoll the great surrow of 1300. Between these befell the great sorrow of his life, the death of his eldest san, William (1773-89), who having robbed his father of £40, and been found by him on an American-bound vessel, shot himself: for a twelvemonth the stern, strong man hardly quitted the honse. An ardent strong man hardly quitted the honse. An ardent if peaceable domocrat, in 1794 he was tried for high-treason with Hardy, Horne Tooke, and nine others. The proceedings fell through, but the animosity of party spirit entailed a run of ill-luck at the theatres, which, combined with unfortunate speculations, led Holcroft to sell off his books and effects (1799), and to retire for four years to Hamburg and Paris. He died 23d March 1809. See the interesting Memoirs, written by himself, and continued by Hazlitt (1815); also Kegan Paul's William Godwin (1876). William Godwin (1876).

Holden, ISAAC, M.P., inventor of the Incifer match and of important modifications in woolcarding machinery, was born 7th May 1807, at Hurlet, Renfrewshire, his father having been a Cumberland farmer and lead-miner. While a worker in a cotton-mill in Paisley, he fitted himself for the post of an assistant-teacher, first at Leeds, then at Huddersfield, and latterly at Reading. It was in 1829, while illustrating chemical experiments to his pupils at Reading, that he made known the principle of the lucifer match. Finding flint and steel inconvenient when he got up at 4 A.M. to pursue his studies, the idea occurred to him to put sulphur under explosive material, which solved the problem of the lucifer match. A young man in his class, the son of a chemist, acquainted his father in London with this discovery, and soon lucifer matches were in the market. Holden never took a patent for this important discovery, and therefore reaped no pecuniary advantage. While book-keeper in a worsted mill at Bingley, Yorkshire (1830-46), he became possessed with the ambition of inventing woolcombing machinery. In 1846 he joined with Mr Lister, who had done much to improve the system of wool-combing, in starting a mill at St Denis, near Paris. The rude wool-combing by steel teeth was done away with by Holder's square motion machine in 1850. Lister retired, and the firm became Isaac Holden & Sous in 1859, and the Alston works near Bradford were founded. After the expenditure of about £50,000 in experiments, Holden's wool-combing machinery brought him both fame and fortune. Holden was member for Knaresborough 1865-68, for the North-west Riding 1892-85, and for the Keighley division of York-shire from 1885.

Holderness, the name of a parliamentary division (including Beverley) and of a wapentake in the East Riding of Yorkshire. Pop. of the former, 41,431; of the latter, 25,341.

Holding, the term in Scots law used to denote the manner in which heritable estate is holden, and corresponding to Tenure (q.v.) in English law. See also FEU, and AGRICULTURAL HOLDINGS ACT.

Holibut. See Halibut.

Holiday, in Law, means Sunday, Christmasday, Good Friday, and any other day appointed for a public festival or fast. In Catholic times holidays were numerous; but modern legislation and enstom have considerably reduced their number. Of late years the importance of holidays to working people has been recognised, and acts have been passed increasing the number of bank holidays. When a bill of exchange falls due on a Sunday, payment must be made the day previous. If it falls due on any of the bank holidays, the bill is payable the day after. In England the courts excuse a man for not giving notice of dishonour of bills of exchange not only on Sunday, Good Friday, and Christmasday, but also even on the festival days of his own religion; and, though there has been no decision in Scotland on the subject, the same rule would no doubt be applied to fast-days prescribed by different sects, and a notice sent on the day following would suffice. But as a general rule, and in all other respects, it may be laid down that no sect, established or unestablished, nor any court or public body, has any power whatever to declare a holiday which has any legal effect, or which can bind the public or the rights of third parties. Nothing but an act of parliament has that effect, and not even a proclamation of the crown would be sufficient. Hence it is that when a solemn national fast is proclaimed, which is to be put on the same footing as a Sunday, it requires a special act of parliament to make it binding on the public in matters of business. See Bank

HOLIDAYS; and for ecclesiastical and popular holidays, see FESTIVALS.

Holinshed, RAPHAEL, an English chronicler, belonged to a good Cheshire family, and, according to Wood, was educated at one of the universities, and became a minister of God's word. He appears also to have been steward to Thomas Burdet of Bromcote, in Warwickshire, and died between 1580 and 1534. The work with which his name is connected is The Chronicles of England, Scotland, and Ireland, published in two folio volumes in 1577. This edition, together with its predecessor, the Chronicle of Hall, was the direct source from which Shakespeare drew the materials for his English historical plays. If we except the history of King John, which stands by itself, these form a regular historical sequence of English kings from Richard II. to Henry VIII., the reign of Henry VII. alone omitted as unsnitable for dramatic representation. And it is not a little interesting and significant that these cover exactly the same period as Hall's Chronicle—a period full of great action and tragical catastrophes profoundly touched with pathos.

The first edition of Holinshed contained many woodcuts which were omitted in the second edition

The first edition of Holinshed contained many woodcuts which were omitted in the second edition (3 vols. folio; usually bound in two, 1586-87), as well as a number of passages cancelled by order of the Privy-conneil as disagreeable to Queen Elizabeth. These castrations were published separately in black letter like the original, by Dr Drake in 1723, and are inserted in their proper places in the splendid edition of the Chronicle published in six 4to volumes (1807-8). This last edition has the particular merit of an exceptionally full index.

Holinshed was by no means the only writer of the work which bears his name, and, indeed, its whole history is not a little interesting. Early in the reign of Elizabeth the queen's printer, Reginald Wolfe, a German by birth, planned 'a Universal Cosmographie of the whole world, and therewith also certain particular histories of every known nation,' and for the historical part of the work had engaged Raphael Holinshed among other men. When the gigantic work was nearly completed Wolfe died, after twenty-live years' labour at his scheme. Those who were to hear the eost of printing the whole now took fright at the expense, and resolved to do only so much of it in the meantime as related to England, Scotland, and Ireland. Holinshed having the history of these countries in hand, application was made to Harrison to furnish the descriptions of Britain and England to be prefixed to the whole. Of the three volumes in the second edition, the first is made up of these and Holinshed's own history of England till the Conquest. The second contains the Description of Ireland by Richard Stanihurst, the translator of Virgil's Æneid into English hexameters, lunself a Catholic and the uncle of Archbishop Ussher; then the history of Ireland to its Conquest, adapted from Giraldus Cambrensis, by John Hooker or Vowell, nucle of the Judicious Hooker; next the history of Ireland to the year 1509 by Holinshed; its continuation to 1547 by Stanihurst; and thence to 1586 by Hooker. The second volume contains further the Description of Scotland by Holinshed, down to 1571, and by Francis Boteville, or Thin, the Lancaster herald, with the help of others, from 1571 to 1586. This was mainly compiled from Bellenden's translation of Boece, John Major, and the continuation of Boece by John Ferreri. The third volume is made up of the history of England from William the Conqueror down to 1577 by Holinshed, and from 1577 down to 1586 by the famous antiquary Stow, Fr. Thin, Abraham Fleming, and others. In the modern six-volume edition of 1807-8 these ar

being devoted to the history of England, the fifth to Scotland, the sixth to Ireland, each having the Description of its proper country prefixed.

Holinshed was an honest and industrious man, and had the advantage of being able to consult the manuscripts of Leland. In the 'Preface to the Reader,' at the beginning of the third volume of the second edition, he says: 'My speech is plain, without any rhetorical show of eloquence, having rather a regard to simple truth than to decking words.' And in his conclusion to the reign of Elizabeth, Abraham Fleming, the contributor of many valuable notes throughout the entire work, describes with modest truthfulness those who had laboured together as 'men of commendable diligence, though not of deepost judgment.'

Holkar, the name of a powerful Mahratta family, the members of which have at various times been formidable enemies to the British empire in India. The founder of the family was Mullar Rao Holkar, who was born in the Decean, 1693, and, having gained by his valour the favour of the Peishwah, obtained from him the western half of Mahrattas.

Holl, Frank, R.A., portrait and subject painter, was born in Kentish Town, 4th July 1845, a son of Francis Holl, A.R.A. (1815-84), the well-known engraver. He was educated at University College School, London, and in 1860 entered the schools of the Royal Academy, where he won gold and silver medals, in 1863 a two years' scholarship for the best historical painting by his 'Abraham about to sacrifice Isaac, and in 1868 the travelling studentship of the Academy by his subject-picture of 'The Lord gave, and the Lord hath taken away.' Four years previously he had begun to exhibit in the Royal Academy with a portrait of himself and a subject-picture, 'Thrued out of Church.' These were followed by various effective genre-subjects dealing almost invariably with pathetic scenes from modern life, such as 'I am the Resurrection and the Life' (1872), 'Want—the Pawnbroker's Shop' (1873), 'Her First-horn' (1876), 'Newgate—Committed for Trial' (1878), 'Ordered to the Front' (1880), 'Returned from the Wars' (1881), 'Deserted' (1884). He was elected A.R.A. in 1878, and R.A. in 1884. About 1877 he turned his attention to portraiture, and specifily attained immense popularity in this department, his works being marked by a powerful frather heavy touch, an effective chiarosenro, and by much dignity of style, though they possess little sweetness of calour, and are somewhat marred by the recurrence of opaque blacknoss in the shadows. Among the most important of his portraits may be named 'Sir Henry Rawlinson' (1881), 'Duke of Claubridge' (1883), 'Prince of Wales' (1884), 'Duke of Cleveland' (1886), 'Sir G. O. Trevelyam' (1887), and 'W. E. Gladstone,' 'Sir William Jenner,' and 'Lord Spencer' (1888). His health suffered from his incessant artistic production, and he died 31st July 1888. A collection of over lifty of his works was brought together in the winter exhibition of the Royal Academy, 1889.

Winter exhibition of the Royal Academy, 1889.

Holland, the popular and generally-accepted name of a country which is officially described as 'Netherland,' or 'The Netherlands,' applies to a maritime kingdom lying between 50° 43' and 53° 36' N. lat., and 3° 22' and 7° 16' E. long. It is bounded on the N. by the North Sea, E. by Prussia, S. by Belgium, W. by the North Sea. Its greatest length from north to south is 195 miles, and its greatest breadth from west to cast 110 miles. It contains 12,630 sq. m.—little more than one-tenth of the size of Great Britain and Ireland, Laxemburg is generally included, but this grandduchy has a distinct government as a separate state,

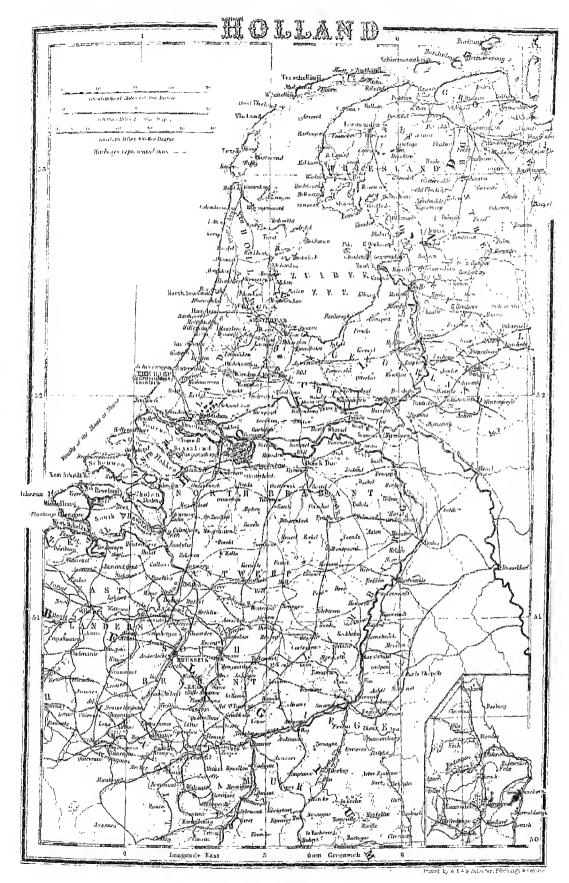
and Holland only possesses a dynastic interest in it, which, moreover, will pass away with the present king's demise (see Luxemburg). The following table gives the population of Holland in 1888, the area of the provinces, and the provincial capitals:

Provinces.	Aren 1a 2q. m.	Fop. in 1888.	Provincial Capitals,
North Brabant Guelderland	1950	510,240 511,278	Bois-le-Duc. Aruliem
South Holland., North Holland	1070	943,405 819,288	The Hague, Haarlem,
Zenland Utrecht	530	201,847 218,638	Muldelburg. Utrecht.
Friesland Overyssel Groningen	1200	339,080 295,606 276,052	Leenwarden. Zwolle.
Drenthe	1030	130,208 260,161	Groningen. Assen. Manstricht.
	12,630	4,505,032	Manuscricity.
Grand-duchy of Luxenhurg	998	(1885) 213,283	Luxemburg,
Total	13,628	4,719,215	

Thus, in spite of an increased emigration to the United States, Canada, South Africa, and the Argentine Republic, the aggregate of population, excluding Luxemburg, gives 350 inhabitants to the square mile. Holland is the most densely peopled country of Europe, after Saxony (540 inhabitants to sq. m.) and Belgium (520). The population is thinnest in the eastern provinces, and densest in North and South Holland, where it averages about 600 to 800 per square mile. About three-lifths of the population are Protestants, and two-lifths Roman Catholics, besides 100,000 Jaws.

In 1889 there were eight towns with more than 40,000 inhabitants—viz. Amsterdam, the capital, 400,000; Rotterdam, 198,000; The Hagne, residence of the king and seat of the government, 154,000; Utrecht, 83,000; Groningen, 54,000; Haarlem, 51,000; Arnhem, 49,000; and Leyden, 46,000.

Physical Aspect.—Voltaire's words, 'Cunards, canaux,' aptly describe the leading features of the country—that, full of water and waterways, swarming with aquatic birds. Like Egypt, Holland, in its greater part, is a delta formed by the alluvium deposited by the great rivers that flow through it into the North Sea. But Holland is not only flat; it is also hollow, and this explains its name—Hollowland. In a large measure the soil lies under the level of the water, salt or otherwise. Along the canals the meadows are 10 or 12 feet, sometimes more, beneath the water-line; by the sea, at high tide, there may be a difference in the level of the soil and of the ocean of quite 25 feet or more. Of course all these lands have to be protected by embankments or dykes, the tops thereof, broad and flat, being used for earriage-roads and foot-paths. The constant battle of the Hollanders against the watery element finds expression in the motto of the province of Zealand: Luctor et emerge! They utilised the mighty rivers, the Rhine, Waal, and Maas, that traverse and fertilised their country, at an early date; and they have covered the land with a network of canals that is probably unique in the whole world. Apart from forming convenient boundaries, these canals serve a twofold purpose: they are mostly navigable for small craft, and they help to irrigate the land. Large windmills are posted at the main points to pump out the superfluous water; hence they form a conspicuous feature of Dutch landscapes. Other windmills near the towns and villages frequently work for different purposes, but they are one and all remarkable for their peculiar shape and the enormous size of their sails, one single sail reaching often to 120 feet. The canals also provide, when frozen, an important medium of communication to skaters.





Some of them date back for centuries; the most ancient is certainly the fossa Drusi in the east, made in the time of Angustus, and referred to by Tacitus. Many canals, regulated by locks (which were probably known in Holland a hundred years before they were introduced into Italy in the 15th century), connect the parallel rivers, and the Yssel forms a link between the Rhine and the canals and meres of Friesland. The latter are vast and somewhat shallow lakes. Thus it is possible to travel on water through the whole of Holland. The principal canals are the North Holland to the Junior; which has a length of 71½ miles; the North Sea Canal, from Amsterdam to Yuniden, on the German Ocean; and the canal from the Maas, near Rotterdam, to the so-called Hoek van Holland, named the New Waterway, which now enables ocean-steamers to reach Rotterdam at all times. We have already described the most important (see CANAL), and we will only add here that in 1890 it was proposed to do away with the locks on the North Sea Canal, making it a level navigable channel for occan-steamers from end to end. The cutting and maintaining of canals in Holland is one of the chief functions of the Waterstaat, a public department that is carried on under an independent minister of the crown, and is entirely conlined to hydraulic engineering. The reclamation of land by the drainage of lakes, and by pushing back the sea and creating what are styled 'polders,' is likewise a leading feature in the operations of the Waterstaat. These newly-reclaimed polderlands always fetch high prices with the Haarlem Lake (q.v.) polder, which was sold in plots at such prices t

forms another task of vital moment; the safety of the state depends upon their constant strength and resisting power where there are no hills or dines to offer a natural protection against the encroachments of water. It is a mistake to suppose that the oceau is Holland's most treacherous and formidable foe; the rivers, when swollen by heavy rains or falls of snow, are much more dangerous. As the riverbeds naturally rise by alluvial deposits, the embeak naturally rise by allithal deposits, the embankments have to be made higher and higher. In times of peril a special dyke service is organised, and headquarters are kept informed might and day by a body of Waterstaat engineers, who direct their trained workmen to the points that are more immediately threatened. Dykes form a communication in the ludgets of form a very expensive item in the Indgets of Holland. Half a million pounds will not cover the annual cost to the state. Besides, many dykes are almost entirely maintained out of local rates. The most formidable and costly sen-dykes are round the western coast-line of Walcheren Island, and near Den Helder in North Holland. These dykes are veritable ramparts, formed by piles at the base, which support a superstructure of earth and stones. The annual cost of keeping one in repair frequently reaches £8000 to £10,000. Despite the care and pre-£8000 to £10,000. Despite the care with pro-cantions of ever vigilant and ingenious men, dis-asters through inundations form but too familiar a feature in the history of Holland. It was a violent irruption of the ocean which created the Zuider Zee in 1247. As Goldsmith says in his Traveller, the Dutchman has 'scooped out an

empire' from the ocean, and the old Dutch proverb that God made the sea but the Hollander the land holds true to this year day.

bolds true to this very day.

Communications.—The oldest railway of Holland is the line connecting Amsterdam and Rotterdam by way of Leyden, which was commenced in 1837. The principle of state railways was settled in 1860, and extended in 1873 and 1875. The whole country is now covered by a network of railways built out of state funds, and in 1890 there were 1630 miles open for traffic. They are not worked by the government, but by a company, which pays the treasury a certain proportion of the net profits. There are several private railways, but the present tendency is to make them state properties. The country roads, mostly paved with bricks, are broad and excellent, but tolls are still maintained. The old-fashioned way of navigating the canals in trekschuiten, or boats drawn by horses, or men and even women, along a towing-path, is tending to disappear. On January 1, 1889, there were 277 chief postal and 27 minor offices. During the year 1888, 187,782,345 letters and 4,084,188 telegrams were forwarded. Postal savings-banks were instituted in 1881; at the end of 1888 the deposits amounted to 13,853,600 guilders.

Clamate, Agriculture, Produce, de.—The climate of Holland is much like the climate of England, especially in its frequent and rapid changes; but, as a rule, the Dutch summer is hotter and the Dutch winter colder. Ague is prevalent in the low-lying regions of the west, and foreigners are particularly liable to suffer from its regrees.

Dutch winter colder. Ague is prevalent in the low-lying regions of the west, and foreigners are particularly liable to suffer from its ravages.

Agueultme in its various branches forms one of the leading pursuits of the Dutch. In 1886 there were 25,555 farm-owners and farm tenants. Land tenure is similar to that in France, and feesimple with peasant proprictorship the rule. Cattlesimple with peasant-proprictorship thermle. Cattle-rearing and dairy-farming have been the Dutch farmer's chief occupations from time immemorial. This explains why arable land in Holland only covers an area of 2,150,000 acres, while meadows cover 2,800,000 acres. The farm-stock in the year 1886 consisted of 272,700 horses, 1,530,800 head of cattle, 802,700 sheep, 1,161,200 goats, and 458,200 pigs. Dutch sheep, very large in size, were formerly exported to England in great numbers, nutil disease stonned the trade, and the same nutil disease stopped the trade, and the same thing happened with cattle. In 1889 the British Privy-conneil again authorised the importation of live Dutch cattle and sheep. Dutch farmers have suffered heavily through cattle disease, which was at its worst in 1874; but the government has succeeded in stamping it out entirely. Dutch beef and Dutch milch-cows are much esteemed in England and in America. The United States and South Africa buy many horned cattle in Holland for breeding purposes, also Friesland horses, which are extremely strong, and Holland trotters. Dairyfarming had fallen off very much, especially in Friesland, once famous for its butter, because the Dutch dairy farmers clung to antiquated methods, and so were outstripped by foreign competitors. Holland, formerly one of the chief markets for dairy produce, has now become the principal producer of butter substitutes. But, taught by disastrous experience and the example of Denmark, the Dutch dairy farmers are at last introducing the 'factory system' and other improvements. Holland exported in 1887 butter to the value of £5,198,300, and cheese to the value of £890,600. The common Dutch cheese comes from Gouda, and the round balls are from Edam in North Holland. The staple agricultural products are wheat, rye, oats, potatoes, beet-root, chicory, dax, and tobacco. The use of modern implements, such as steam-ploughs, &c., is now spreading rapidly, like the application of artificial manures.

The soil of Holland is not uniformly fertile. Large tracts of land, especially in the eastern provinces, are simply heath; and the waste lands of Holland covered an area of more than 1,700,000 acres in 1887. A society has been founded for the afforestation of these tracts. The orehards of Boskoop, pruducing excellent fruit, like the prolific district of Westland, should be mentioned, as also the famous culture of Dutch bulbs at Haarlem and the surrounding districts.

the surrounding districts.

Minerals.—As may be readily believed, minerals are scarce in Holland; but valuable clay for the manufacture of tiles, bricks, and pottery is found everywhere in great abundance, and the making of the famous old Delft-ware is now reviving. Coal is worked in Limburg, and also a soft

sandstone.

Manufactures, Industrics, &c.—The chief manufactures are linen, woollen, eotton, and silk fabrics, paper, leather, glass, &c. Leyden, Tilhurg, and Veenendaal are famed for woollen blankets, wooldyed pilot, fine cloths, and friezes; 's Hertogenhosch (Beis-le-Due) for linens and rich damasks. Calicoes, shirtings, drills, table-elaths, striped dimities, &c. are made at Almelo, Amersfaort, and other leading towns. Excellent imitation Sonyma carpets are manufactured at Deventer, and imitation Scotch and other kinds are made at Delft, &c.; turkey-red yarms, dyed silks, and silk stuffs at Roemond, Utreebt, Haarlon, &c.; leather, glass, fireams at Maastricht and Delft; iron-founding, rolling and hammering of lead and copper, camonfounding are carried on at The Hagne, &c. Brewories are munerous (541 in 1887): Middolburg, Bois-le-Due, Amsterdam, Nimegnen, &c. have important mes, those of Bois-le-Due and Amsterdam mamnfacturing large quantities. Waalwijk, Hensden, and surrounding districts manufacture boots and shoes. Gin is distilled at Schiedam, Delft, Rotterdam, and Amsterdam. The distilleries of gin ('Hollands') form an important branch of Dutch industry, nearly 400 existing at the end of 1887. The liqueur factories are of national importance. Amsterdam has had the largest diamond-entting trade in the world, 10,000 persons dopending on that branch of industry; but latterly, owing to varions causes (the dearness of rough stones being one of them), the trade has fallen off. Sugar-tenining was carried on by 12 establishments in 1888, and there were then also 30 beet-root sugar factories, 57 salt-works, and 87 soap-works. The manufacture of cocoa has assumed enormous proportions in the last few years, and large works are established at Woesp, near Amsterdam, at Amsterdam itself, and Rotterdam. North Brahant is the principal centre of the Dutch margarine trade, exported te England in immense quantities. In 1888, of 1,138,174 evt. imported into the United Kingdom, more than 1,000,000 evt.

Fisheries.—The fisheries of Holland, although no longer so important as at one time, are still noteworthy. At the end of 1884 they gave employment to 11,906 men and boys, on board 3236 vessels. The herring fishery in 1887 produced 3,769,841 barrels of fish in the North Sca alone, and 266,966 tons of salt herrings were exported that same year. Trawling is extensively reserted to. 'Dutch coopering' has been virtually abolished by the international North Sca Conventions (see COOPERAGE). In 1887, 35,000,000 oysters were taken, and nearly 14,000,000 thereof exported to England. The fisheries of Holland are estimated to yield

annually £3,000,000.

Imports, Exports, and Shipping,—The Dutch are no longer the 'corriers of Europe,' but their earrying trade is still very considerable. The total imports of 1888 reached £90,695,602; the total exports,

£73,125,628; the exports and imports to and from the United Kingdom, £27,666,634 and £16,862,601. These totals include those of the Dutch colonies. It is not generally known that Holland of all European countries does the largest amount of foreign trade per head of population: in 1888, £37, 7s. 14d. per head (more than thrice that of Great Britain and Ireland). In 1887 the mercantile marine consisted of 516 sailing-vessels and 460 steamers, with 14,565 sailors.

Receive, Expenditure, &c.—The revenue of 1890 was estimated at about £10,109,000, and the expenditure at £11,256,000. The East Indies revenue for 1890 was estimated at £10,077,000, the expenditure at £11,700,000. The East India colonies, once a burden, were long a source of profit, but are now a burden again. From 1850 to and with 1874 £25,376,218 was paid off from the national debt. In 1880 the debt amounted to £78,601,216, and the ammal interest payable on it was £2,328,000; in 1888 the debt proper was upwards of £88,000,000, besides £1,250,000 in paper money. The annual charge, even after a recent reduction, was still estimated at £2,581,000 for 1890. The great bulk of the national debt is held in Holland; the national prosperity is increasing, and an enormons amount is invested in foreign funds and American railways.

Colonics.—The colonies of Holland are stated to have an area of upwards of 700,000 sq. m. (more than three times the area of the German empire), with a population of about 30,000,000. They fall into two groups: (1) the East Indian possessions, including Java and Madura, Sumatra, the Molaceas, Celebes, Timor, parts of Berneo, and the western part of Naw Guinea; and (2) the West Indies, of which the chief are Surinam and Curação. The factories on the coast of Guinea were dispassed of by sale to Great Britain in 1872. The principal colonies are treated at length in separate

articles.

Government.—The government of Halland is a limited constitutional monarchy. The modern Grondwet, or Constitutional Law, of 1848, was altered in 1887 to suit new electoral and other requirements. The crown is the executive power; legislation is vested in the States-general. The king presides at a council of state, whose members are appointed by him. Its functions are similar to those of the Privy-council in Britain. He also selects ministers, who countersign all ruyal decrees, and whose responsibility is settled by a special law. The States-general is divided into a first and a second chamber. The second chamber consists of one hundred members, the first chamber of fifty members, the former being elected by direct suffrage, the latter by the provincial cenneils from among the highest-taxed citizens in the state, or those that hold or bave held important public posts. The members of the second chamber are elected for four years. Only male subjects thirty years old, in the full possession of their civic rights, are eligible. Each member receives by way of salary £166 a year, and, besides, a stipend for travelling and incidental expenses during each session. The members of the first chamber are elected for a term of nine years. No one can be a member of the two chambers simultaneously. Ministers may sit in both, but only possess a consultative voice. The second chamber alone has the right of amendment and of initiating legislation. All judges are appointed by the crown for life. There is a supreme tribunal (at The Hagne), and ministers, members of the States-general, and certain high officials can he arraigned only before it. There is no state religion, but the state supports financially the different churches.

Education.—Primary instruction is provided by the state in all places where it is required. Private schools are freely permitted, but subject to inspection; and teaches must qualify for their task under a government examination. There are ancient universities at Leyden, Utrecht, and Groningen, and since 1877 a new university at Amsterdam, supported by the municipality. The four universities have apwards of 3000 students. There are also the Royal Military and Naval Academy at Breda, and that for engineers and the Indian civil service at Delft, besides seminaries in several places for the training of the Roman Catholic clergy, &c. The state pays 30 per cent. of the expenditure on the public schools, and the communes or parishes 70 per cent. In 1886 there were 2936 public schools, 65 subsidised private schools, and 1127 non-sub-idised private schools. The pupils in the public schools then numbered 444,678. In the same year 590,595 children under twelve received some sort of school education, but 74,156 none. There is no compulsory attendance in Holland, and many can neither read nor write (9.8 per cent. of illiterates in 1883).

are market and are many can be the read nor write (9.8 per cent. of illiterates in 1883).

Army, Navy, &c.—The strength of the regular army in Europe is about 62,000 men, and of the colonial army about 40,000 men, some 15,000 thereof being Europeans. Dutch troops are not allowed to be sent to India. The Dutch home army is composed of volunteers, and of a varying proportion of men drawn by lot for five years' service. There is also a local force, called Schutterif, drawn by lot from those between twenty-five and thirty-four years of age, to assist in keeping order in peace, and in case of war to act as a mubile corps, and do garrison duty. North and South Holland

can be immedated at short notice.

The royal navy on 1st January 1887 consisted of 120 men-of-war, 24 heing ironelads. Six are large cruisers, each of 3400 tons, built of iron and steel. There are also numerous torpedo hoats for the

defence of the coasts and river months.

History.—About a century and a half before omera, a Tentonic people, known to the Romans as the Batavi, and who came from Hesse, occupied the land between the Rhine and the Waal. At this time the Frisians occupied the country north of the Rhine to the Elbe. The Batavi and Frisians differed little in appearance, manner of life, and religion. They clothed themselves with skins, fished, hunted, and led a pastoral life; were faithful, frank, claste, and hospitable. The songs of the bards composed their literature and history. Warlike and brave, they selected their leader for his courage and prowess, and were armed with a bow and a short spear. They worshipped the sun and moon, and held their meetings in consecrated woods.

The Romans having subdued the Belgar, next attacked the Frisians, who agreed to pay a tribute of ox-hides and homs, but centinued restless and rebellions. The Batavi became allies of Rome, paying no tribute, but supplying a volunteer contingent, chiefly of cavalry, which was renowned for its impetatous hravery, and helped to win the battle of Pharsalia for Casar. About 70 a.d. Clandius Civilis, a Batavian, made a bold effort to overthrow the Roman power in Rhenish or Germanic Gaul, but failed in the end. Roman supremacy endured until the 4th century, when the inroads of the Salie Franks were followed by the Saxons and other tribes. The Franks took possession of the Insula Batavorum, and the name of the Batavi vanished. Christianity spread among these tribes, and even the Frisians, who were violently opposed to it, were forcibly converted by Charles Martel. At the end of the 8th century all the Low Countries submitted to Charlemagne, who built a palace at Nimegnen, on the Waal. The feudal system now began to develop itself, and

dukedoms, counties, lordships, and bishoprics arose, the hishops of Utrecht, the dukes of Guelderland, and the counts of Holland being among the most powerful of these petty mlers, who owned but very little allegiance to their lords. During the 9th and 10th centuries the districts of the modern Netherlands belonged to Lotharingia, which acknowledged alternately French and German sovereignty. The nucleus of the countship of Holland, and the beginning of its power, were the work of Dirk III., who died in 1039. Count William II. was even made King of the Romans (1248) through the influence of Pope Innocent IV. The Crusades weakened the power and resources of the nobles and prelates, so that, during the middle ages, eities began to assume importance, strengthen themselves with walls, and choose their own rulers.

In 1384 the earldon of Flanders passed, through marriage, to the Duke of Burgundy, whose grandson, Philip the Good, made it his special life-effort to form the Netherlands into a powerful kingdom. He bought Namur, inherited Brahant with Limburg, and compelled Jacoba of Bavaria to resign Holland and Zealand. Charles V., as heir to Burgundy, inherited and united the Netherlands under his sceptie. He fostered trades and industries in the Low Countries, and under his rule they attained a great prosperity, whilst cities like Bruges and Gleent reached the zenith of their wealth and power. But he also tyrannised over the land with an iron will and hand, drained the life-blood of the nation for his continual warfare, and depopulated north and south by an implacable Inquisition, which it is computed put to death in various forms at least 100,000 persons for heresy. Yet he was at times popular with the people. He spoke their language. He always remained a Fleming; and Glient, after attempting to betray him and rising in rebellion against him in 1339, owed her ultimate escape from the destruction which Alva counselled escape from the destriction which Alva counselled entirely to the fact of the emperor's citizenship. His son Philip II., who succeeded to the throne in October 1555, was a character of the very opposite type. A Spaniard born, he remained a Castilian to his dying day—austere, harsh, narrow, domineering, fanatical. He never spoke a word of Dutah, nor did he and ever spoke a word of , fanatical. He never spoke a word of nor did he understand the people. With Philip II. commenced that terrible and desperate and long-fought struggle of Holland and Spain which finally resulted in the throwing off of the Spanish yake, in the establishment of a free, strong, and prosperous commonwealth among the maislies of the low-lying delta. This heroic contest of the few against the many, of a handful of isolated burghers against the combined forces of the most powerful state in Europe, has excited a wonderful amount of interest in the civilised world. Motley, with the now count-less editions of his great work, The Rise of the Dutch Republic, and its continuation, has done more to popularise the story of the so-called Eighty Years' War of the Low Countries against Spain than any of his predecessors.

Philip II. only remained in Holland for four brief years and then left it, never to return, appointing as regent Margaret of Parma, mother of the famous Farnese, and a natural daughter of Charles V., with a conneil, to which belonged Yiglius, Berlaymont, the afterwards notorious Cardinal Granvella, Bishop of Arras—all frieuds and flatterers of the young king and enemics of the people—as well as Egmont, who had won the battles of St Quentin and Gravelines for Philip, and the king's lieutenant in Holland, Zealand, and Utrecht, young William of Onange, then completely unknown to fame. As the latter took leave of Philip, who was embarking at Flushing to return to Spain, the king litterly complained to him of the opposition already mani-

fested against his measures. These were mainly the maintenance of a standing Spanish army and of the Inquisition—both contrary to the laws and privi-leges of the people, as well as to his own solemn yows before ascending the throne. Orange tried to vows before ascending the throne. Orange tried to persuade the king that he had nothing to do with the resistance complained of, as the Estates were acting on their own responsibility when they had petitioned his majesty. Whereupon Philip seized the Prince of Orange by the wrist, shaking it violently, and exclaiming in Spanish, No los Estados, ma vos, vos, vos! ('Not the Estates, but you, you, you!'). The king on this memorable occasion showed as much persoicactly as his reign occasion showed as much perspicacity as his reign betrayed perverseness and perfidy. In William of Orange, then only twenty-six years old and six years his innier, Philip had truly recognised his worst foe, his most dangerous opponent, and the soul of the coming stringle against the royal authority. The king's secret correspondence is there to confirm this view. Born on 16th April 1533, William belonged to an ancient family ruling a small principality in the south of France (see ORANGE), but his ancestors, originally vassals of the pope, had settled in the Netherlands, where they occupied high functions under the princes of the House of Bargundy. William bad heen a favourite with Charles, whom he accompanied everywhere. It was thus that William had been able to acquire that profound knowledge of the militury art, and to grasp the intricacies of the prevalent occult diplomacy in which he afterwards proved himself such a consummate master. proved numself such a consummate master. It was while he was hunting with the king of France in the Forest of Vincennes that Henry II. communicated to William of Orange the fiendish plot France and Spain had concerted to massacre all the Protostants in both countries. Henry II. did not know then the man to whom he had been so communicative: he had spoken to William the Silent. The prince never betrayed the least emotion. He prince in his become the manifest of a crime which buried in his bosom the project of a crime which, although a devont Catholic himself (though a Protestant afterwards), he had resolved to prevent at all hazards. He saw the storm coming. determined to face it, to devote his fortune, his best powers, and his life to the cause of the weak against the strong, of the free against crushing despotism, fighting Philip with his own weapons, and having but one noble, self-sacrificing ambition-the wolfare and the liberty of the people.
There is no doubt that Philip was betrayed by

those in whom he had most implicit confidence, and that William of Orange knew of all the king's intentions and movements. Thus he was aware that Alva had collected an army in Italy by the orders of Philip in order to extirpate an abouninable rebellion of heretics by sword, and re-establish the Inquisition. The prince warned his friends Egmont and Hoom in good time against the imminent danger; but they heeded not what he said, and paid for their folly on the scalfold of Brussels as soon as Alva had arrived there with 10,000 picked troops and had established his Council of Troubles. This was no better than a council of butchers, and hy means of it 20,000 inoffensive burghers were lurried to their doon. William escaped to Germany in order to organise the national defence with his brothers. But his task was well-nigh hopeless. What could be do with a handful of ladf-paid and under fed hirelings? In 1572 the position of affairs could scarce have been more desperate. The Spaniards were absolute masters of the land, and the people, crushed under a reign of bloody rapine, lad ceased to hope for deliverance, when the bold eapture of Briel, by the Beggars of the Sea, on the lat of April 1572—a great date in Dutch history, duly honoured in 1872—changed the whole aspect the successes of the Dutch, especially at sea,

of affairs. They were maranders, those Beggars of the Sea, desperadoes clinging to the broad, hospitable ocean, after having been driven from the land by the Spaniard; but they were also patriots who had adopted as a title of honour the opprobrious chithet that Berlaymont had given them when they were petitioning the regent for the maintenance of their rights, and they held Briel for 'Father William.' Their during capture became the sign of a general revolt, and soon William the Silent was again at the head of affairs, 'in the name of the king,' still nominally maintained as the ruler of the land. Orange's projects, which consisted of a junction with the French Hugnenots, were indeed direfully frustrated by the butchery of St Bartholomew. The southern portion of the Low Countries could not be delivered from the clutches of the enemy and were for ever lost to the cause of freedom; but the north continued the struggle single-handed, and at last Alva had to depart in disgust without having accomplished his mission. His successors could do nothing to retrieve Philip's fortunes or damp the inspiriting influence which the heroic defence of towns like Haarlem, Leyden, and Alkmaar had infused into the burghers of the new state. The military chest of the Spanish commanders was always empty, as the Dutch, masters on the sea, cut oll all supplies, and revolts were frequent among the Spanish soldiery. Ottavio Parnese, Dake of Parma, who sneeded to the lieutenancy in 1578, saw but one way of settling the question, and that was the forcible removal of the question, and that was the forcible removal of William of Orange. Philip, who had held all along the same sinister designs, was only too eager to fall in with this plan. In June 1580 there appeared that infamous ban, which declared William a traitor, a miserent, and an outlaw, putting a heavy price upon bis head (25,000 gold crowns), and provincing the kind's prepared and titles of validation. mising the king's pardon and titles of nobility to whosoever might be found willing to rid the land of him. William replied in his famous Apologic; but he was not able to cope with a royal assassin. Numerous attempts against the prince's life were made, and although they failed for a time, the bravo's work was finally accomplished. Balthasar terards, the miserable instrument of a royal murderer, shot William dead with a pistol, purchased with the very money the prince had given him by way of alms to a 'poor Calvinist.' This took place at Delft on 12th July 1584, near the top of a staircase which has been preserved in the same state ever since. Gerards was arrested, tortured, and ever since. finally put to death in an atrocious manner; but no expiation, however awful, could bring to life

again the noble patriot.

The blow was crushing and irreparable, yet William might have fallen at a moment even more critical to Holland than July 1584. He did not leave his country in a state of paralysed chaos. The Union of Utrecht, accomplished in January 1579, had comented the alliance of the northern provinces banded together against the king of Spain; and the solemn declaration of July 1581, by which the free Netherlands for ever renounced their allegiance to Philip II., had virtually completed William's task of deliverer. His manifesto of renunciation and denunciation would alone have sufficed to stamp him as a man of genius in the eyes of posterity. It is a remarkably clear, bold, and spirited defence of a people's rights against the claimed rights of the anointed king at a time when the former had been forgotten. Yet William's doom, far from undoing his work, as Philip and Parma hoped, only tended to make it more dur-able. The bloody deed seemed to spur the whole nation to a revolt fiercer than ever. Maurice of Nassau followed in his father's footsteps, and

became more numerous. Parma, indeed, took Antwerp after a long siege, but failed to effect a junction with the Armada in 1588, as the Hollanders prevented his fleet from leaving the Scheldt; and when the great general died in 1592, six years before his master, he had not accomplished his mission. Philip III. was not more fortunate, and could do nothing better than sign in 1609 the twelve years' armistice with the 'rehels,' who were already masters of the sea, had laid the foundations of their great Indian empire by the establishment of the East India Company in 1602, and practically had made their own conditions. Manrice had been against the armistice, but he was overruled by the States, who wanted peace for trading. Unfortunately, the breathing time to 1621 was in a large measure filled up with religious and political dissensions between the adherents of Gomarus, the orthodox Lutherans, and the Arminians, the mildermannered followers of Arminius, to whom Hugo Grotius and other celebrated men of the time belonged. These disputes culminated in the persention of the Arminians, who were forced to flee, like Grotius, or were put on their trial for high-treason, fike Olden Baneveldt, the Grand-pensionary of Holland, and one of her most distinguished sons, who was beheaded in 1618 with the approval of Manrice. But these internal troubles did not check the progress of the new republic. Manrice died in 1625, and his brother Frederick Henry finally freed his country from the Spaniards, who in 1648 were compelled to recognise the 'rebels' as an independent nation by the treaty of Munster.

mally freed his country from the Spaniards, who in 1648 were compelled to recognise the 'rebels' as an independent nation by the treaty of Munster.

In this epoch lies, perhaps, the period of Holland's greatest material and intellectual development. Her ships could be seen everywhere, and the Dutch had become the general carriers of the world's trade. Amsterdam, grown powerful and rich, was the Venice of the north, where, besides commerce proper, both hanking and stockbroking reached a flourishing stage at an early period. From this emporium started the fleets of the great trading companies, and the vessels of intepid explorers like Hudson, Heunskerek, Houtman, Lemaire, Tasman, and many others. Dutch agriculture and florienlture, gaining new experience and teaching fresh methods, grew famons, and so did many branches of science and industry. The first optical instruments came from Holland, and Huygens gave us the pendulum-clock. Arts and letters flourished, and the names of Erasmus, Grotins, Vossins, Burman, Gronovins, Boerhaave, Spinoza, Huygens, Rembrandt, Cnyp, Van der Helst, Hobbema, Potter, and many more became known and illustrions far beyond the national frontiers. The art of printing, perhaps not a glory of Holland in its inception (see PRINT-ING), had at anyrate attained a high degree of perfection there in the 17th century, as the names of Plantin and Elzevir testify. The liberty of the press, seenred at an early date, led to the establishment of numerous newspapers, Dutch and foreign. The foreign news-sheets of Holland, mostly published in French, were sent all over the world, as they contained the latest intelligence and things that were not allowed to appear in print elsewhere. The Gazette de Leyde was among the oldest and most powerful of these early iournals (1680-1814).

The Guzette de Leyde was among the oldest and most powerful of these early journals (1680-1814). The rising power of Holland had the natural result of creating envy and empidity in her nearest neighbours. The first serious antagonism came from England, where trade and navigation were also rapidly coming to the front. Both countries wero then pure commonwealths—Cromwell ruling in England, and the Grand-pensionary John de Witt having virtually the destinies of the United Provinces in his hands since the death of Frederick Henry's son, the last stadtholder before William

III. Cromwell's Act of Navigation, which aimed at the destruction of Holland's monopoly in the carrying trade, led to the great naval war of 1652-54, during which twelve important battles, more or less decisive, were fought, and both nations distinguished themselves by the intrepid daring of their commanders and seamanship. Yet otherwise the result was barren, though the names of De Rnyter, Tromp, Evertsen, and Van Galen shone forth ever afterwards. These hostilities between Holland and England were renewed when Charles II. had been restored by General Monk; but the war of 1664-67 remained as undecisive as its predecessor, despite De Rnyter's daring feat of saling up the Medway, which caused for a while

wild panie in the British capital.

An ensuing war with France, now allied with England against the United Provinces, was much more serious, as De Witt had done his best to strengthen the navy, but at the cost of a totally neglected army. The hosts of Louis XIV, under captains so famous as Condé and Turenne, made short work of all resistance that Holland could offer on land, although De Ruyter's fleet kept the allied squadrons at bay, and thus, probably, saved his country from political annibilation. At the most critical juncture a violent popular reaction set in against De Witt and his brother Cornelis, and in favour of the young Prince of Orange, who had been held back by their party. John de Witt, one of the most clear-headed and hold statesmen of his day, was murdered as a traitor by an infuriated mob at The Hague, and the stadtholdership reestablished in the person of a prince then (1672) only twenty-two years of age. But the people's instinct had been right after all, for William III.'s accession proved the salvation of Holland, as it also accomplished, later on, the political regenera-tion of England. The fortunes of the war changed tion of England. The fortunes of the war changed immediately with William at the head of affairs. He showed himself an able tactician and a still more skilful diplomatist. By dexterously manœuvring between Holland's enemies he managed to gain time and isolate France. At last, in 1678, Louis XIV, was compelled to sign the treaty of peace of Nimeguen, as William had become, for the time being, the ally of the king of England, by his marriage with Mary daughter of the Duke by his marriage with Mary, daughter of the Duke of York. William was not satisfied with what the peace of Nimeguen gave to Holland; and the following years were passed in preparing for the great events which he no doubt saw rapidly approaching. The revocation of the Ediet of Nantes looded Holland once more with political refugees, who here found a new fatherland, and who subsequently helped to fight the battles of Europe against their common tyrant. In the English Revolution of 1688 by Wilham III., many of these Hugnenots played an active and prominent part. To Holland the inauguration of the new era in England did not mean peace, but it meant an honourable alliance and security from further encroachments of the French king. The Dutch troops fought bravely in the battles of England, even after William's death in 1702; and Ramillies, Oudenarde, and Malplaquet, which saw Louis's research to the will be a secure of the security of the s greatest linmiliation, were as much Dutch victories as La Hogue was an English victory.

The peace of Utrecht, in 1713, marks the close of Holland's activity as a great power in Europe. For her the 18th century was the century of demoralisation and decay. After William's death she became a republic once more; the stadtholdership was re-established in 1747, but it made no difference in the downward course. The National Convention of France having declared war against Great Britain and the stadtholder of Holland in 1793, French armies overran Belgium (1794); they

were welcomed by the so-called patriots of the United Provinces, and William V. and his family (January 1795) were obliged to escape from Scheveningen to England in a fishing-snack, and the French rule began. The United Provinces now became the Batavian Republic, paying eight and a half millions sterling for a French army of 25,000 men, besides giving up important parts of the country along the Belgian frontier. After several changes Louis Bonaparte, 5th June 1806, was appointed king of Holland, but, four years later, was obliged to resign because he refused to be a mere tool in the hands of the French emperor. Holland was then added to the empire, and formed into seven departments. The fall of Napoleon I. and the dismemberment of the French empire led to the recall of the Orange family and the forma-tion of the southern and northern provinces into the ill-managed kingdom of the Netherlands, which in 1830 was broken up by the secession of Belginm (q.v.). In 1839 peace was finally concluded with Belginm; but almost immediately after national discontent with the government showed itself, and William I. in 1840 abdicated in favour of his son. Holland heing moved by the revolutionary fever of 1848, King William II. granted a new constitution, according to which new chambers were chosen, but they had searcely met when he died, March 1849, and William III. (born 1817) ascended the throne.

The bill for the emancipation of the slaves in the Dutch West Indian possessions, passed in 1862, decreed a compensation for each slave, and came into force in 1863. The expenses of this enuncipation came to £1,065,366, and the number of slaves set free was about 42,000, of whom \$5,000 were in

Dutch (Ininna.

set free was about 42,000, of whom 35,000 were in Dutch (4niana.

In 1863 the naval powers bought up the right of the king of Holland to levy toll on vessels navigating the river Scheldt (q.v.), the king of Belgium binding himself also to reduce the harbour, pilot, and other charges on shipping within that kingdom. In 1868 the Laxemburg (q.v.) question was sottled in a manner satisfactory to Holland. Next year capital punishment was abolished. In 1872 a new treaty with England, defining and limiting the sphere of influence and action of Britain and Holland in the Indian Archipelago, and removing the restrictions of the treaty of 1824 as to Sumutra, was followed by a war with Atcheen, until then an independent Malay state in North Sumatra (see Atcheen), a war that severely taxed the military and financial resonrees of the Dutch-Indian government, and is still carried on, in a modified form, the so-called conquest of 1873-75 notwithstanding. The present king having no living male issue, the succession to the crown was vested in the Princess of Orange, Wilhelmina, the only child of King William's second marriage, born in 1880. Of lato years the great question of internal politics has years the great question of internal politics has been the new constitution, which was duly promulgated November 30, 1887. This act increased the electorate of Holland by no less than 200,000 voters. A revision of the school-laws in a sectarian sense was carried early in December 1889. Meanwhile, in 1888, the queen, Emma of Waldeck, had heen appointed regent in the event of the king's demise, and a conneil of gnardians named to assist her in the education of Princess Wilhelmina.

Language and Literature.—Dutch is an essential link in the chain of Tentenic languages, a wonderful storehouse of old and expressive Germanie words and phrases. It has been said that Old English is Dutch, and to no other nation is the study of the Notherlandish more interesting than to the English. Without a knowledge of Dutch it is almost impessible to properly understand the historical

development of English. It is a common mistake to suppose that Dutch is merely a German dialect. As a language it has existed as long as German, and passed through the same series of evolutions. and passed through the same series of evolutions. It possesses many affinities with German, because, like Frisian, Danish, &c., it sprang from the common Tentonic stock (see Durch; and for the relation of Dutch and Low German to High German, see (†ERMANY, Vol. V. p. 186); but between modern High German and modern Dutch there is less similarity in vocabulary than between modern English larity in vocabulary than between modern English and modern Netherlandish, although the pronunciation differs much more in the latter case. Three great periods of development must be distinguished in the Netherlandish language, as in the German; the first was the period of inception, or of Old Netherlandish, when doubtless various Tentonic dialects existed among the tribes and peoples that had penetrated westward from the Ellie and the Oder. A curious relic of this ancient Netherlandish exists in a fragmentary translation of the Psalms, dating from the 9th century. It of the Psalms, dating from the 9th century. It of the Psains, cating from the 9th century. It does not seem to belong to any one language, but looks like an attempt at combining the dialects then existing. The second period comprises the Middlo Netherlandish, which developed soon after the 11th century, and became the popular tongue of a very considerable area, spreading far beyond the Rhine in the east, and covering not only the area of Beloium, as it now exists but also greater part of Belgium, as it now exists, but also the northern portions of France, where Old Dutch persists to this very day in the villages, with the wondrons tenneity of popular tongues. The second period is rich in fublicate and romances of chivalry, period is rich in fieldinex and romances of chivalry, but these were nearly all of foreign origin, mostly French and some English. Among them we name Ferquet, Roman van Lancelot, Walerein, Floris en Blancefloer, all republished of late, but not easily understood without a dictionary of Middle Netherlandish. Reinaert (see REYNARD THE FOX) is a truly national cpic of considerable importance. But the most prominent representatives of Middle But the most prominent representatives of Middle Netherlandish literature are Jakob van Maerlant (18th century) and Jan Boendale (14th century). The former was the anthor of the famous Spieghel llistoriael; the latter wrote didactic poems, the best known of which is Der Leken Spieghel. To this period also belong Jan van Heelu's description of the battle of Woeringen and Melis Stoke's chronicles of Holland.

The origin of new Netherlandish or Dutch is to be found with the Raderijkers, whose rise can be traced to the commencement of the 15th century. They were mainly lovers of letters and the theatrical art, banded together in Kamers, 'chambers,' or clubs, for the purpose of study and mental recreation. In the course of time, when the tyenbles with Spain arose, these clubs no doubt also became eentres of political agitation, and this led to their suppression in the southern provinces; but in the north, as seen as political freedom had been attained, they developed into literary associations of considerable importance. The most famous was the 'chamber' called In Lieftle Blocificade ('thriving in love') at Amsterdam, to which Coornhert (1522-90), Spiegel (1549-1612), and Roemer Visseher (1547-1620) belonged, the latter a literary merchant, and the father of two ladies who became celebrated for their learning amongst the men of letters of that period. Coornhert, Spiegel, and Visscher in 1584 caused a Dutch grammar to be published, and this may be called the foundationstone of modern Netherlandish. Hooft (1581-1647) was the first to recognise the worth of his mothertongue and to write a classical Dutch in which he strove te eliminate as much as possiblo all foreign elements, although a great admirer of classical lore and fereign literature, especially

French and Italian. At Muiden he formed a literary club which exercised very great influence. Hooft wrote his Historien, but he also excelled in poetry and in the drama. Among his famous contemporaries is Vondel (1587-1679), who is considered the greatest of Holland's poets, and who, indeed, soars high in his dramas, still performed before appreciative audiences in our days. Milton, it is said, borrowed from Vondel, and passages taken from the masterpieces of the two poets certainly bear a curious resemblance. Vondel, some of whose dramatic works have been translated into German and English, was a very prolific poet. Yet his poetry can hardly be called so popular as that of Jacob Cats (1577-1660), whose maxims were for a long time, with the Bible, the only book found in every cottage. Cats is witty, but coarse; and Bredero, whose comedies deserve mention, is scarcely better in this respect. Van der Goes, who composed a beautiful poem on Amsterdam, ranks among the best of Vondel's disciples (1647-84); Oudaen (1628-92) is noted for his political poems and his dramas; Constantyn Huyghens, the father of the great mathematician, for his epigrams and his dramas; is still read and admired); and Brandt, for his historical writings.

This is the great period of literary activity in Holland previous to the revival which marked the end of the 18th century. Writers who were desirous of being read beyond the limits of their vernacular had to use Latin; and Erasums, Boerhaave, Grotius, Spinoza, to mention only a few of the most famous, would scarcely have been so well known had they written exclusively in the lan-

guage of Vondel.

The 18th century is the period also of literary decadence in Holland; the only great names are those of Peith and Bilderdijk (1756-1831). The latter wrate puetry such as has not been equalled since in the Datch language, and it is a national loss that his great epic poem, The Destruction of the First World, remained unfinished. Bilderdijk also ranks high as a historian, and his phildlogical studies deserve credit, though his learning was sometimes misled by his ingenuity. Among Bilderdijk's contemporaries are Helmers, whose patriotic songs against the French created in Holland as profound a sensation as Körner's in Germany, and the two literary ladies, Deken and Bekker, whose novels (one of them translated into German), written in conjunction, are true pictures of Dutch life in those days. The poems of Tollens (1780-1856) came later, and still retain their hold on the popular fancy (especially in the words of the national hymn) notwithstanding the appearance of numerous still more modern competitors, among whom we can only mention here Van Beers, Bects, Da Costa, Schimmel, Hofdijk, and J. Van Lennep. Schimmel is also noted for his dramas and historical romances, the plots whereof he loves to place in England, when not in Holland. Beets has been truly called the Charles Dickens of the Dutch, as his inimitable Camera Obscura (sketches of Dutch life) proves. These two anthors are not miknown in England and America, as portions of their work have been translated. So have some of the stirring novels of Van Lennep. Hofdijk, who died in 1888, is known for his faithful and cloquent historical writings not less than for his lyrical poetry. Potgicter, Ter Haar, Heye, Ten Kate, and many others have each excelled in a particular branch of poetry. Among noteworthy novelists we must mention Hendrik Conscience, 'Miss Wallis' (a dangliter of Dr Opzonner), and Mrs Bosboon Toussant; and we cannot conclude without paying a tribute to the undoubted gifts of 'Multatuli' (Douwes Dekker), whose Max

Hardaar, translated into nearly every Enropean language, will remain a monument of literary genins as long as a Intel literature exists. In law and theology the Hollanders have always been to the fore, and the names of Opzonner, Knenen, and Kern are now as well known without as within

the kingdom.

In this necessarily rapid sketch we have made no distinction between Dutch writers in Belgium and Dutch writers in Holland. In fact, there is no distinction; they express their thoughts in the same language. The words 'Flemish' and 'Flemlander' have been invented by the French, and only serve to obscure what is a fact—viz. that there never has been a greater difference between the Dutch as taught at Autwerp and the Dutch as taught in Austerdam than between Boston, Edinburgh, or Manchester English. There have been slight varieties in the spelling; but these have disappeared since the orthography of 1864 has been adopted in both the north and the south, and modern Netherlandish is now the language of some 7,000,000 Netherlanders, of whom 2,500,000 politically belong to Belgium. This is perfectly well understood in the two countries themselves, where Dutch philological and literary congresses are annually held in a northern and a southern centre by turns. In Belgium there are more Dutch than Walloons, and the Belgian constitution does not recognise a preponderating French language. No doubt the Dutch Belgians have only latterly insisted upon the maintenance of their rights in this respect; but ever since the so-called 'Flemish movement' commenced they have steadily gained ground, and all the French eneroachments are being swept away. Dutch is being taught everywhere in the schools, and a knowledge of Dutch is essential in many functions, even in those of the king, who was taught Netherlandish by the great novelist Hendrik Conscience. The latter was one of the prime movers in the Dutch reaction in Belgium, where with the names of Willeins, Blommaert, Snellaert, Snieders, Hiel, Van Beers, &c. will for ever remain associated—some as fiery poets, some as noted prose-writers.

For statistics, consult the annual Stautsalmanak, which possesses a semi-official character; the publications of the Dutch Statistical Society, Annaterdam, particularly Jaarciffers, a statistical annual in French and Dutch, in two parts, one of which deals with the colonics; the Algeneeue Statistick, in several volumes, which is an official survey of the kingdom, with full particulars, but now somewhat antiquated in many details; the annual reports of British consuls in the Netherlands; the Almanach de Gotha, &c. For general descriptions and travel, see the works of Montégut, Esquiros, and particularly Henri Havand; his volumes in pleasant French (three of which, The Heart of Holland, Picturesque Holland, and The Dead Cities of the Zuyder Zee, exist in English) have much contributed towards propagating sound knowledge of the land and people. D'Amicis' Ollanda (trans. into English) is also useful. For history, the writings of Prescott, Motley, Thorold Ragers, Wagenaar, the very valuable collections of Gachard and Groon, the histories of Th. Juste, Bilderdijk, Fruin, Arend, Nuijens, Hofdijk, &c. (all in Dutch, except Juste, who wrote in French) should be consulted. The most accessible literary history is Schneider's Geschichte der Niederl. Literatur (Leip. 1888), which is also the best in many ways.

Holland, in contradistinction to the kingdom of that name, is the oldest, wealthiest, and most populated part thereof, forming two provinces. North and Sonth Holland. The province of North Holland has an area of 955 sq. m., and a population of 803,460 in 1888. It comprises the peninsula to the west of the Znyder Zee, and also the islands that fringe this great gulf on its northern side. To the west North Holland is bounded by the German Ocean, and to the south by the province

of South Holland. This latter prevince has an area of 1162 sq. m., lying between the German Ocean and the provinces of Zealand, Utrecht, and North Brahant. It had a population of 927,209 in 1888. The population of both North and South Holland is largely agricultural. It is in these provinces that the best corn is grown, the best cattle reared, and the best dairy produce brought to market. But as the largest towns of the kingdom (Amsterdam and Rotterdam) are also situated in the two provinces, its chief trade and industries, with nearly the whole of its shipping, are carried on in them.

Molland, originally a fine kind of linen manufactured in the Netberlands, and now a coarse linen fabric, unbleached or dyed brown, which is used for covering furniture, &c.

Holland, PARTS OF. See LINCOLNSHIRE.

Holland, LORD. HENRY RIGHARD FOX VASSALL-HOLLAND, third Baron Holland, F.R.S., an English statesman, was born at Winterslow House, Wills, in 1773, and succeeded to the title on the death of his father, the second baron, in 1774. He went to Eton, and thence to Christ Church. He was trained for public life by his colebrated uncle, Charles James Fox, after whose death he held the post of Lord Privy Scal in the Grenville ministry for a few months. He then shared the long banishment of the Whigs from the councils of their sovereign. During this long and dreary interval Holland, to use the language of Mucualny, was the 'constant protector of all oppressed races and perscented seets. He held unpopular opinions in regard to the war with France, and signed a protest against the detention of Napoleon at St Helena. On the other hand, he laboured to ameliorate the the one mand, he handred to antendrate the severity of the criminal code; made manful war, though a West India planter, on the slave-trade; threw his whole heart, though a landowner, into the struggle against the Corn Laws; and, although by rank and breeding an aristocrat, laboured incessantly to extend and confirm the rights and liberties of the content. of the subject. In 1830 he became Chancellor of the duchy of Lancaster, and a member of the reform the dieny of Earl Grey, and these posts he also held in the Melbourne uninistry. He died at Holland House, Kensington (celebrated for its literary society and hospitality), October 22, 1840. He wrote hiographies of Gaillen de Castro and Lope de Vega, translated several Spanish comedies, prepared a life of his uncle, and edited the memoirs of Lord Waldegrave. His son, fourth Lord Holland (1802-59), edited two posthumous works, Foreign Reminis-cences (1850) and Memoirs of the Whig Party (1851). See the Princess Marie Lichtenstein's Holland House (1873).

Holland, Str. Henry, physician and writer, was born at Knutsford, Cheshire, on 27th October 1788. He received his professional education in Edinburgh, where he graduated in 1811. He then spent two or three years in the east of Europe, and in 1815 published Travels in Albania, Thessaly, &c. He settled in London in 1810, and soon hecame one of the recognised heads of his profession, his success being largely due to his social gifts. In 1828 he was elected a Fellow of the Royal College of Physicians; in 1840 he was appointed physician-inordinary to the Prince Consort, and in 1852 physiciau-in-ordinary to the Queen. In the following year he was created a baronet. His Medical Notes and Reflections, published in 1839, consist of 34 essays upon various departments of medicine and psychology; it has passed through several editions. In 1852 appeared Chapters on Mental Physiology, which are expansions of those essays in his former work which treated of 'that particular part of human physiology which comprises the reciprocal

actions and relations of mental and bodily phenomena.' Other books from his pen are Essays on Scientific Subjects (1862) and Recollections of Past Life (1871). Holland died at London, 27th October 1873. He was related in different degrees to Josiah Wedgwood, Mrs Gaskell, and Charles Darwin, and married for his second wife a daughter of Sydney Smith.

Holland, Henry Scott, preacher and theologian, was born at Ledhury, in Herefordshire, in 1847, and educated at Eton and Balliol. He took first-class honours in 1870, and, after having been theological tutor at Christchurch and select preacher, he became canon of Truro in 1882 and canon of St Paul's in 1884. He has published some remarkable volumes of sermons, including Logic and Life (1882).

Holland, Josiah Gilbert, an American anthor, was horn in Belchertown, Massachusetts, 24th July 1819, and gradnated at the Berkshire medical college, at Pittsfield, in 1844. He soon abandoned his profession, however, and after fifteen mouths as a school superintendent at Richmond, Virginia, became assistant editer of the Springfield Republican, of which he was part proprietor also from 1851 to 1866. In 1870, with Roswell Smith and the Scribners, he founded Scribner's Monthly, which he conducted sneedsfully till his death, 12th October 1881. In this magazine appeared his novels, Arthur Bonnicastle (1873), The Story of Screnocks (1875), and Nicholas Mintern (1876). His Timothy Tetcomb's Letters (1858) went through nine editions in a few mouths; and this sale was exceeded by his Life of Lincoln and his most popular poems, Bitter Sweet (1858), Kathrina (1867), and The Mistress of the Manse (1874). Most of Holland's works have been republished in Britain.

Holland, Philemon, styled 'the translator-general at his age,' was born at Chelmsford, in Essex, in 1551. He became a Fellow of Trinity College, Cambridge, and in 1591 took at that miversity the degree of M.D. He afterwards practised medicine at Coventry, and in 1628 was appointed head-master of the free school there. He died on 9th February 1636. His more notable translations were Livy, Pliny's Natural History, Suctomias, Plutarch's Morals, Ammianus Marcellians, Xenophon's Cyropardia, and Cauden's Britannia. His son, Henry Holland, a bookseller in London, published Heroologia Anglicana (1620) and Busiliologia (1618).

Hollands. See GIN.

Hollar, Wenceslaus (1607-77), etcher. See Enghaving, Vol. IV. p. 380.

Holles, Denzil, Lord, one of the 'five members,' was the son of the Earl of Clare, and was born at Houghton, in Notthighamshire, in 1597. He entered parliament in 1624, and at once joined the party opposed to the king's government. On March 2, 1629, he was one of the members who held the Speaker in his chair whilst resolutions were passed against Arminianism and tounage and poundage. For this act he was condemned by the Court of King's Beach to pay a fine of one thousand marks, and to be imprisoned in the Tower during the king's pleasure; he remained there about a twelvementh. He was one of the members of parliament whom Charles accused of high-treason and attempted to arrest in 1642. On the outbreak of the Civil War he was charged to hold Bristol; but, dreading the supremacy of the army more than he dreaded the pretensions of the king, Holles was a steady advocate of peace. He was a foremost leader of the Presbyterian party. For having in 1647 proposed to disband

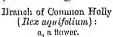
the army he was accused of high treason; but, the army his native land, he found refuge in Normandy. Again, after a brief return visit to England in the following year, he went back to Brittany, and stayed there until Cromwell's death. On his reappearance in England Holles set to work to effect the restoration of the Strarts; he was the spokesman of the commission delegated to carry the invitation of recall to Charles II, at Breda. In 1661 he was created a peer as Lord Holles of Isfield in Sussex. His last important public duty was the negotiation of the treaty of Breda in 1667. Although thus cuployed in the service of the crown, Holles still clung faithfully to his love of liberty, and remained stanuch in his support of the governing rights of parliament; and as Charles's propensities towards absolutism became more pronounced Holles leaned more to the opposition. He died on 17th his country and of liberty, 'a man of great courage and of as great pride. He had the soul of a stabborn old Roman in him.' See Memoirs written by himself (1699); also S. R. Gardiner's History.

Holloway, a district of London, in the parish and parliamentary borough of Islington, on the N., has a population of 47,924.

Holloway College, situated at Mount Lee, Egham, Surrey, near Virginia Water, is an insti-tution founded in 1883 by Thomas Holloway (1800-83), patentee of Holloway's pills and Holloway's cintment (see ADVERTISING), for the purpose of supplying a suitable education to women of the middle classes. The building, which is constructed in the French Renaissance style, was opened by the Queen in 1886. The management is vested in the hands of twelve governors. Holloway also founded a sanatorium or hospital for the mentally afflicted belonging to the middle classes,

Holly (*Ilex*), a genus of trees and shruls of the natural order Aquifoliacete, chiefly natives of temperate climates; with evergreen, leathery, shining, and generally spinous leaves; small flowers





northern limit; and and displays greater it attains a greater size luxuriance in the northern than in the southern parts of its geographic range, often appearing in the former as a tree of considerable size, 20 to 50 feet high, whilst in the latter it is generally a more bush. It prefers light soils.

There are mimerons varieties of holly produced, or at least perpetuated, by cultivation, exhibiting great diversity in the leaves, of which the Hedge-hog Holly may be mentioned as extremely simonand spinous, whilst others are prized for their colour, golden, silver-blotched, &c. The flowers of the common holly are whitish, axillary, nearly numbellate, and often diccions by abortion of the pistil; hence the harrenness of certain varieties, and occasionally also of individual trees of otherwhich are remarkable for having the stamens only or the pistils only perfect as the case may be; the former of course never hear fruit. The fruit is small, scarlet, rarely yellow or white. The abundance of the fruit adds much to the ornamental character of the tree in winter, and affords food for birth larth. for birds: but to man it is purgative, emetic, and dimetic, and in larger quantities poisonous. leaves are inodorous, have a mucilaginous bitter and somewhat anstere taste, and have been used medicinally in cases of gout and thenmatism, as a diaphoretic, and also as an astringent and tonic to correct a tendency to diarrhea, &c. The leaves and small branches, chopped, are sometimes used for feeding sheep in severe winters. The root and bark are emollient, expectorant, and diuretic. Birdlime (q.v.) may be made from the inner bark. The wood is almost as white as ivory, very had and fine-grained, and is used by cabinetmakers, turners, musical-instrument makers, &c., and sometimes for wood-engraving. Handles of tools and handles of metal teapots are very often made of handles of metal teapots are very often made of it. The holly is often planted for hedges, as it bears clipping well, and makes an excellent fence. A holly hedge may either be kept low, or, as is the case at Tyninghame, in East Lothian, allowed to grow to the height of 20 or 30 feet. In the gardening of former days hollies were often clipped into fantastic shapes. The name holly used to be derived from the very ancient use of the branches and berries to decorate churches at Christmas (said to be connected originally with the Roman Saturnalia), from which the tree was called Holy Tree. Really holly which the tree was called Holy Tree. Really holly (O. E. holyn) shows the same root as in Irish cullean, German hidse, Old French houls (see EVERGREENS, and the illustration there). The American holly (I. opaca) is common along the Atlantic coast from Maine southwards .- Mate (q.v.), or Paraguay Tea, is the leaf of a South American species of holly (I. paraguensis). I. romitoria has been erroneously named South Sea Tea, from the impression that it was the same as I. paraguensis. The Indiansmoked it as a substitute for tolacco. I. cassing and I. Dahoon are natives of the same region of the United States. I. gongonha, which grows in the provinces of Minas Gerues and São Paulo, Brazil, has leaves which have been substituted for Para-gnay Tea. The fruit of I. maconcona contains a great quantity of tannin, and mixed with a ferruginous carth is used to dye cotton.

According to the Darwinian theory of the origin of thorns, spines, and prickles, these structures serve either as a protection against the attacks of the larger animals (the view expressed in Southey's 'Holly-tree') or as climbing organs. The ancestors of the holly are supposed to have had spincles leaves which were eaten by large browsing animals, and thus the holly ran the risk of extermination, until some individuals, dwarfed and checked in growth from the losing of their tender shoots, developed spines which protected them from the attacks of animals. These spine producing hollies had an advantage over their spineless neighbours and became the survivors. In support of this theory is the fact that many varieties of holly above a certain height develop leaves without spines; and this is explained by saying that these leaves were beyond the reach of animals which attacked the plant, and therefore spines were not formed on these higher leaves because they were unnecessary. A more recent view of the origin of spines denies altogether the agency of animals. According to this view the bitter nature of holly leaves is sullicient to repel any animal from making food of them. The presence or absence of spines on the leaves is the result of the metabolism of the plant. Those plants which have grown in rich soil under favourable climatic conditions are vigorous individuals with large spineless leaves; while hollies which have grown in poor soil under unfavourable conditions have shrubby stems and small curled spiny leaves. The former plants are healthy and well fed; the latter half starved and ill conditioned. The former are the highly anabolie, the latter the katabolie individuals.

Hollyhock (Althwa rosea), a plant of the natural order Malvaceae, commonly referred to the same genns with the Marsh Mallow (4.v.). It has a tall, straight, hairy stem; heart-shaped, cremate, wrinkled, five- to seven angled leaves, and large



Hollyhook (Althera rosea).

axillary flowers without. almost stalks ; the leaves diminishing bracts, and the upper part of the stem forming spike; the petals hairy at the base. The hollyhack is a native of the Mediterranean, is to be seen in almost every garden in India, and has been much cultivated in gardens in Britain from a very early period. At present it is a flower, Involutio and varieties, the result of cultivaaretion, very numerous. It varies much in the colour of the flowers, and double and semi-It is an antumnal

double varieties are common. It is an antumnal flower, continuing till the frost sets in. The plant is a biennial or perennial, but in the latter condition histing only for three or four years in a healthy state. The stem rises to a height of 8-15 feet, unbranching, or nearly so. Since 1870-75 the plant has all but succombed to what is known as the hollyhock disease, caused by a species of fingus (Paccinia) which attacks the leaves and finally proves fatal, unless prompt measures are adopted to arrest its progress. Sulphur dusted on the affected leaves has proved the most effectual enre. The filmes of the plant have been made into yarn, but it is not yet certain if it is really vabuable for cultivation on this account, or for the manufacture of paper. It is not improbable that it might be enlivated with advantage to afford green fodder for cattle, which are very fond of its leaves, and the leaves are produced in great abundance if the plant is prevented from flowering. The flowers are muchaginous and demulcent, and are sometimes used like those of mallows and marsh mallows. The leaves yield a fine blue dye.—The Chinese Hollyhoek (A. chinensis) is an allied species.

Molman, James, 'the Blind Traveller,' was born about 1787, and, entering the navy in 1798,

had risen to be a lientenant when, in 1810, the loss of sight compelled him to quit the service. Yet, being of an active temperament, he in 1819-21 travelled through France, Italy, and the countries touching on the Rhine. Encouraged by this, he conceived the plan of travelling round the world, and had penetrated to Irkutsk in Siberia, when he was arrested as a spy by the Russian government and carried back to the frontiers of Poland. Nevertheless, undanuted by this failure, he again set off in 1827, and this time effectively accomplished his purpose. Finally, he visited the countries of south-east Europe. He died at London, 29th July 1857. He published Journals of bis successive journeys, which contain much more useful information than could be expected from the circumstances under which it was gathered.

Holmby House, a fine Tudor mausion, 62 miles NW. of Northampton, was built by Sir Christopher Hatton in the reign of Elizabeth. It was sold to James I., and was for four months in 1647 the prison of Charles I. (q.v.). It was dismanded in 1652.

Holmes, OLIVER WENDELL, born in Cambridge, Massachusetts, Angast 29, 1809, was the son of Rev. Abiel and Suntah (Wendell) Holmes. His father was a Congregational cappulate 1890 in 18 an inister, the antbor of Annals of by J. D. Deplacet America and other works; his company. Mother, descended from a Dutch ancestor, was related to many well-known families in New England and New York. He entered Harvard College at the age of sixteen, and graduated, in what heeame a famous class, in 1829. He began the study of law, but after a year gave it up, and entered upon the study of medicine. After the enstomary course at the medical school of Harvard he spent over two years in the hospitals and schools of Europe, chiefly in Paris; and on his return home took the degree of M.D. in 1836. Three years later he was professor of Anatomy and Physiology at Dartmouth College, but after two years' service he resigned and engaged in general practice in Boston. He married in 1840 Amelia Lee Jackson, daughter of a justice of the Supreme Court of Massachusetts. (Three children were born of the marriage, of whom one, O. W. Holmes, jun., served as a captain in the civil war, and is a judge and an eminent writer upon legal subjects.) In 1847 he was appointed professor of Anatomy at Harvard, which place he hold until 1882. He was highly respected as a man of science, and heloved as an instructor; but as time went on his literay genirs quite overhore his professional zeal, and it is as a poel and essayist that he will be remembered.

He began writing verse while an undergraduate, but his first efforts were not remarkable. While in the law school he contributed to the Collegian a few poems of a light and humorons character which first gave indications of his future power; among these are 'Evening, by a Tailor' and 'The Height of the Ridiculous.' There is a reminiscence of his life in Paris in the tender poem beginning 'Ab, Clemence! when I saw thee last.' A little later was written 'The Last Leaf,' which contains one perfect stanza, and which from the blouding of quaintness and pathos is perhaps the most fortunate and characteristic of his minor poems. For some years the muse visited him by stealth, the votary fearing for his professional reputation in a town so noted for propriety. A small volume of these early poems was published in 1836. Twenty years passed with desultory efforts and a slowly-growing power, when by the publication of The Autocrat of the Breakfast Table (1857–58) he became suddenly famous. No literary event since the Nortes had more strongly affected the reading world. The snecess was due

to its fresh, unconventional tone, its playful wit and wisdom, and to the lovely vignettes of verse. Apart from the merits of thought and style, the pages have the charm of personal confidences; the reader becomes at once a pupil and an intimate friend. The tone assumed is egotistical, but the friend. The tone desanted is eguir-deal, our sine force and the comedy (as every man with imagination sees) are bound up in that assumption. The Professor at the Breakfast Table (1858-59) was written upon the same lines and has qualities equal to those of its predecessor, but it deals with deeper questions and in a less familiar way. The Poet at the Breakfast Table (1872) takes the reader into the region of religious and philosophical ideas. 'God is Love' is the keynote of its doctrine. His first effort in fiction was Elsic Venner (1859-60), a study of hereditary impressions and tendencies. The Guardian Angel (1867) is a picture of smal New England. A Mortal Antipathy was written in 1885. It is scarcely a novel as the term is generally 1850. It is scattery a nover as and term is generally understood, but there is a thread of story on which the author hangs his observations, as he had done before in the Autociat. The introduction to this book is autobiographical and historical, and gives book is autobiographical and historical, and gives a delightful view of Camhridge as it was in the author's hoyhood, and a sadly amusing account of early American literature. The works before named appeared in the Atlantic Monthly, of which he was one of the founders. He wrote for it also many occasional essays and poems. Besides the early volume (1836), he published Songs in Many Keys (1862), Songs of Many Seasons (1875), The Iron Gate (1880), and Before the Curfew (1838). His other (prose) works are Currents and Counter-currents (1861), Soundings from the Atlantic (1864), Border Lines of Knowledge (1862), Mechanism in Thought and Morals (1871), and Memoirs of Motley (1879) and Emerson (1885). He is also the writer of the biographical sketch of Emerson in this Eneyelopædia, and of Our Hundred Duys in Europe eyelopædia, and of Our Hundred Duys in Europe (1887), an account of a visit made in 1886, during which he received honours from the universities of Cambridge, Oxford, and Edinburgh.

It is difficult to make a summary of the traits of a writer so versatile, and who has achieved success in so many fields. By his own generation he will be remembered as a great talker, in the highest sense. The present writer never met his equal. His intellect is keen and powerful; his observation is intellect in a positive for the large and property and a present would be actionally and account. is instinctive; and his enthusiasm and energy would have carried through a man of less brilliant parts. His verse is melodious, compact, and rounded by art; its Gallic liveliness tempered by the even measure, and enforced by the point, of the 18th century. There is not in it a trace of the manner of recent English poets. Still, in its thought, its humanity, and its suggestions of science, it is seen that he is a way of his own century and among the numanty, and its suggestions of science, it is seen that he is a man of his own century, and among the most advanced. Among specimens of his varied powers may be cited 'The Lust Leaf,' already mentioned, 'The Chambered Nautilus,' 'Grandmother's Story' (of the hattle of Bunker's Hill), 'Sun and Shadow,' 'For the Burns Centennial,' 'On lending a Punch-bowl,' and 'The One-hoss Shay.' He is specially happy in his tributes to Intoher meets especially happy in his tributes to brother poets— as to Longfellow and Lowell, and to Whittier on his soventieth hirthday. During the civil war he wrote many impassioned lyries in defence of the Uniou—probably the best patriotic songs of the time. Of his prose it may be said that, whatever war by the white the defence of the control of the prosecount of the control of the said that whatever war to be said that, whatever war to be said that when the said that we want to the said that the said that we want to the said that the sai may be the subject, it always engages attention, and is always sui generis. The reader feels himself in contact with a strong mind, full of the fruit of reading, and with a character that is full of sur-prises. The choice of words is directed by a poet's inevitable instinct, and the general treatment is both precise and delicate. In the essay upon Mechanism in Thought and Morals there is an

aenteness and subtlety which might have made a metaphysician; only that might have deprived the world of one of its most original and delightful essayists. There are degrees of value in his works, but it appears that his fame will rest chiefly upon The Autociat, The Professor, and certain of his Of his writings in general it should be said noems. that, though his sparkling wit and flowing humour are evident to the most easual reader, a closer study reveals other and more stately qualities which give him a place among the great writers of the time.

There are Lives by W. S. Kennedy (Boston, 1883) and Emma E. Brown (1884), the latter with a list of his writings.

Holocephali. See Cartilaginous Fishes. Holofernes. See Judith.

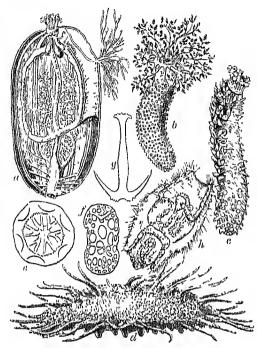
Holograph. See DEED.

Holoptychius (Gr. holos, 'all,' and ptychē, 'wrinkle'), an extinct genus of Ganoid fishes from Devonian and Carboniferons strata, type of a family the members of which are remarkable for their sculptured or wrinkled scales and extraordinary labyrinthine tooth structure.

Holothurians (Holothurioidea), a class of animals belonging to the sub-kingdom Echinodermata (q.v.), from the other members of which they are readily distinguished by a more or less worm-like appearance. They are popularly known as Seacucumbers or Sea-slugs. The word holothourion was nsed by Aristotle for a marine animal which we are now mable to identify, and the Latinised form was appropriated as a generic title by Linnaus in 1758. His genus was practically co-extensive with the present class. As in all Echinodermata, the symmetry of the adult body is apparently pentagonal, but, instead of presenting the appearance of rays diverging in one plane from a common centre, these are bands running along the sides of a cylinder. Very frequently they are not equidistant from each other, and then the radiate symmetry passes over into a bilateral one. The most common arrangement is for three rays to be approximated to each other on the ventral and two on the dorsal aspect. body of a Holothurian consists of a sac of leathery emisistency (whence the name Seytodermata sometimes used for them), made up of a cuticle, layers of cells, connective tissue, nerve-fibres, and calcare-ous plates and muscles. The calcareous plates are the sole remnants of the skeleton which is so largely developed in other Echinoderms. They are of varions shapes, resembling wheels in Chirodota, plates and anchors in Synapta, and spines in some other genera; in Psolus there are overlapping scales. The mouth is ordinarily at one end of the body, but occasionally on the ventral surface; it is surrounded by a ring of tentacles whose number is some multiple of five, and opens into a gullet surrounded by a circle of calcareous plates. The digestive tract is ordinarily disposed in a loop; the last portion before the vent (cloaca) is a large space, which has appended (except in two subdivisions) a pair of branched outgrowths, the respiratory trees, and certain processes of unknown function, known as the Carlerian organs.

The gullet is surrounded by the ring-shaped central nervous system, and also by a tube belonging to the ambulaeral or water-vascular system, which is so generally distributed among the Echinodermata. It gives off a branch forwards to each ten-tacle, and sends one backwards along each of the five radii of the body, to supply the tube-feet, the principal locomotor organs. The annular tube bears also a reservoir, the Polian vesicle, and communicates either with the body-cavity, or sometimes with the outside by means of a canal. The sense-

organs consist of auditory vesicles situated near the anterior end of the body, and containing small cal-carcous corpuseles (otoliths), and of the tentacles above mentioned. These may be either simple or above mentioned.



a, Senddagammatic view of the viscera of a Holothurian belonging to the Aspidochirotic. Projecting from the upper end are the fentacles, lower down the calcarcous ring, and still tower in the niddle line the two Politan vesicles. The intestine is shown passing to a loop to the hinder end of the body; within part of its convex it is seen to be attacked to the body, wall by a mesentery. Two respiratory trees open late its expanded termination or closes, which is connected to the walls of the body by radiating nauscalar bunds. Longitudinal noiseless pass train the anterior to the posterior and of the action. To the plant is the branched central gland with its due. (Fron the right is the branched genital gland with its duct.

Lemms, by Phyllophorus in m, one of the Dendrockirotae, ½d nat. size (from Lemms); c, Holotkurla tubulosa, one of the Aspidochholae, ½th mit size (from Lemds); d, Onehophorta mutabilis, one of the abysal Elmshoda, ½d nat. size (from Theel); e, calcan conswheel, from the lategument of Chirodota purpurea, magnified 100 diameters (from Theel); f, g, plate and anchor of Symple flexit, highly magnified (from Theel); h, larval form (Auxieularia) of Holothuria labulosa, highly magnified (from Selenka).

branched, and in a few cases they are furnished with suckers. In the Elasipoda tactile organs are present in the form of dorsal papille.

The generative organs consist of a bunch of tubes, with one end closed; their duct opens either within or just outside the circle of tentacles. The egg develops as a rule into a curiously formed hilaterally symmetrical larva, formerly described as a distinct animal under the name Anrichlaria. In a few cases the development is direct; in Cucumaria erocca the young are borne among the tentacles of the parent, whilst in *Psolus aphippifar* they are carried in a special ponch on the back.

The class is subdivided as follows:

I. ELASHODA, published deep-sea forms; bilaterally symmetrical; tube-feet on the ventral surface, papilla on the dorsal. No respiratory trees. A very large number of genera and spices lave been obtained by the Challenger and other deep-sea expeditions.

II. Pidata, with well-developed tele-feet and papilla.

(1) Aspidechirote, with tentacles hearing a disc, and ten calcareous plates round the guiltet. The genus Hotelmira as now understood belongs here.

(2) Deadrochirotae, with arborescent tentacles—e.g. Cucumaria, Psolus.

III. Arona, devoid of tube-feet and papilla.
(1) Pheninonophora, with respiratory trees—e.g. Molpadia.
(2) Apneumona, with neither radial water-vascular canals, respiratory trees, nor Cuvenan organs—e.g. Synapta, Chirodota.

The Holothurians are all marine, and have a world-wide distribution; traces of them have been deposits of Scotland. They either take in large quantities of sand and absorb the mutritive matters mixed with it, or devour small animals. On strong contraction, caused by sudden irritation, the whole digestive canal and its appendages are not unfrequently ejected; but these are regenerated after a In some species the cloaca is inhabited by a small parasitic fish of the genns Fierasfer. pang (q.v.), or brehe-de-mer, a great delicacy among the Chinese, consists of dried Holothurians.

Holstein, formerly a duchy belonging to Deumark, and at the same time a member of the Germanic Confederation, was annexed in 1866 to Prassia, which incorporated it in the province of Sleswick-Holstein. It is separated from Sleswick on the N. by the river Eider and the North Baltie Canal; is bounded on the E. by the Baltie Sea, the territory of Lubeck, and the duchy of Lanenburg; on the S. by the Hamburg territory and the Elber and on the W. by the North Sca. One eighth of the surface consists of marshes. The central disfrom north to south by a low heathy and study ridge. The soil, with the exception of several tracts of sand and heath, is very fruitful, especially in the marshes. The climate and natural producthe markers. The entire and mental productions closely resemble those of similar districts in the march of Germany. Salt and gypsum are the only minerals found. Peat is plential. Against are and the rearing of cattle are the chief employments, though market gardening flourishes in the neighbourhood of Altona and Hamburg, and shipning in the scaport towns, and fishing along the coasts, especially for oysters in the North Sea. Area, 3237 sq. m.; pop. about 560,000—mostly Germans of the Low German stock. The history of Holstein will be noticed under Sleswick.

Holston, Karl Christian Johann, an eminent Protestant theologian, born at Güstrow in Mecklenhurg-Schwerin, 31st March 1825. He studied theology and philology at Leipzig, Berlin, and Rostock, and became in 1852 a teacher at the Rostock gynnesium. In 1870 he was called to the Bern High School as an extra-ordinary professor, next year became ordinary professor, and in 1876 obeyed a call to a similar post at Heidelberg. His startling contribution to Pauline theology, Zum Evangelium des Paulus und Petrus (1867), was followed by Das Evangelium des Paulus (vol. i. 1880), Die drei ursprünglichen, noch ungeschriebenen Evangelien (1885), and Die Synoptischen Evangelien nach der Form thres Inhalts (1886).

Holt, Sir John, lord chief-justice of the Court of King's Bench, was born at Thame in Oxfordshire, on 30th December 1642. After leading a wild life as a student of Oriel College, Oxford, he entered at Gray's Inn, reformed his manners, and was called to the lar in 1663. He ligured as conusel in most of the state-trials of that period, and generally as pleader for the defendants. In 1666 he was made recorder of London and king's serjeant, and was knighted. On the accession of William III. he was knighted. raised to the dignity of lord chief-justice of the King's Beneh, and filled the post to his life's end. He died 3d March 1710. Sir John Holt occupies an honourable place among the dignitaries of the English bench on two accounts. Contrary to the practice of his predecessors, he treated those who appeared before him with uniform fairness and Although politically a Whig, Holt's judijustico.

cial career was entirely free from the stigma of party bias or intrigue. He distinguished liquidle liquid liquidle liquid liquid liquidle liquid liqu

Holtzendorff, Franz von, a German writer on law subjects, was born 14th October 1829, at Vietmannsdorf in Brandenburg. Educated for the law, he practised in the courts at Berlin till 1837, when he became a lecturer on law at the university. Made professor there in 1861, he was in 1873 called to Munich. He is known as an anthor on several branches of law, and especially as an advocate for the reform of prisons and penal systems. Among his numerous works may be mentioned one on deportation, and another on the Irish prison system (1859); Die Principien der Politik (1869); Encyclopadie der Rechtswissenschaft (1870-71; 4th ed. 1882); Handbuch des Deutsrhen Strafrechts (1871-77); and Handbuch des Volkerrechts (1885).

Holtzmann, Adolf, a celebrated Germanist, was born at Carlsruhe, 2d May 1810, first studied theology at Berlin, then Old German philology under Schmeller at Munich, and next Sanskrit under Burnouf at Paris. In 1852 he was appointed professor of the German Language and Literature at Heidelberg, where he died, 3d July 1870. Among his numerous contributions to philology are Ucber den griech. Ursprung des Ind. Tierkreises (1844); Ind. Sagen (1845-47); Kelten und Germanen (1855), in which both are maintained to have been originally identical; and Untersuchungen über dus Nibelungenlied (1864), in which the views of Lachmann are assailed. His last work was a projected Altdeutsche Grammatik. After his death Holder edited from his papers German. Altertimer (1873), Deutsche Mythologie (1874), and Die altere Edda (1875).—Of his brothers two attained eminence, Karl Heinrich Alexander (1811-65) as a lecturer and writer on applied mathematics; and Karl Julins (1804-77) as a preacher and ecolesiastie at Carlsruhe.

Holtzmann, Heinrich Julius, an eminent theologian, was son of the Germanist Adolf Holtzmann. He was born at Carlsruhe, 17th May 1832, became in 1861 extra-ordinary, in 1865 ordinary professor of Theology at Heinelberg, and obeyed in 1874 a call to the theological faculty at Strasburg. Holtzmann set out as an exponent of the 'Vernittelungtheologie,' but gradually let slip its assumptions, and now stands one of the chief representatives of the more advanced modern school.

Among his writings are Kanon and Tradition (1859), Die Synoptischen Erangelien (1863), Kritik der Ephaserund Kolosserbriefe (1872), Die Pastoralbriefe (1881), and an introduction to the New Testament (1885). Besides these he prepared the New Testament portion of Bunsen's Bibelwerk; published two volumes of sermons (1865 and 1873); along with G. Weber, leschichte des Volkes Israel (1867); and with Zöpffel, the Lexikon für Theologic und Kirchenwesen (1882). He has also contributed extensively to the theological reviews.

Holy Alliance, a league formed (1816) after the fall of Napoleon by the sovereigns of Russia, Austria, and Prussia, whereby they pledged themselves to rule their peoples like fathers of families, and to regulate all national and international relations in accordance with the principles of Christian charity. But the alliance was made in actual fact a means of mutual encouragement in the maintenance of royal and imperial absolutism, and an instrument for suppressing free institutions and checking the aspirations for political liberty struggling into realisation amongst the nations of the Continent. The league died a natural death after the lapse of a few years.

Holy Coat of Treves. See TREVES.

Holy Ghost, See Spirit, Creeds.

Holy Grail. See GRAIL.

Holy Grass (Hierochloc borcalis), a sweetsmelling grass helonging to the tribe Phalaridete, about a foot high, with a brownish glossy lax paniele. It is sometimes strewed on the floors of churches on festival-days, whence its name.

Holyhead, a scaport and parliamentary borough of Anglesey, North Wales, is situated on a small island of the same name, 60 miles E. of Dublin, 85 W. of Chester, and 264 NW. of London. Although recently much improved, it is still a primitive, irregularly-built town. It is the tenninus of the London and North-Western Railway (1850), and the port for the mail steam-packets to Dublin, which perform the voyage in about four homs. The shipping accommodation consists of a harbour with two divisions, and a roadstead sheltered by a breakwater. The harbour was extended in 1873-80, and the quay lengthened to 4000 feet. The roadstead or harbour of refige (1847-73), with an area of about 400 acres, is protected from the sea on the north by a solid masonry wall, rising 38 feet 9 inches above low-water mark, and backed by a strong rubble mound (see Breakwater, Vol. II. p. 413). Pop. (1875) 5622; (1881) 8680, employed in the coasting trade and in shipbuilding and rope-making. Till 1885 Holyhead united with Amlweb, Beanmaris, and Llangefui in sending one member to parliament.

HOLYHEAD ISLAND, lying west and forming part of Anglesey, is 8 miles long by 3½ broad. Area, 9658 sq. aeres; pop. (1881) 10,131. The island is separated from Anglesey by a narrow sandy strait, crossed by a canseway, along which run the Holyhead road and the Chester and Holyhead Railway, and arched in the centre for the tide to pass beneath. The surface is for the most part rocky and barren. On the northwest coast are two islets, the North and South Stacks, the latter with a lighthouse, whose light, 197 feet above high-water, is seen for 20 miles. The Stacks and the north coast are hollowed out into magnificent caves, the hannt of sea-fowl.

Holy Island, or Lindisfarne, a small island of Northumberland, 9½ miles SE. of Berwick-on-Tweed. It is 3 miles long by 1½ broad, and has an area of 2457 acres. At low-water it can be reached by walking across the sands, a distance of 3½ miles; at high-water the strait covered by the sea is 1½ mile wide. The village (pop. 686) is guarded by the castle, built about 1500, and still in good repair. The island is chiefly interesting for the mins of its Benedictine priory church. This was built in 1093 out of the materials of the ancient cathedral, erected here in the 7th century, under the anspices of Bishop Aidan. Here a company of Columban monks established themselves, and grew into the famous priory of Lindisfarne, the luminary of the north, the Iona of England. It reached its greatest glory under St Cuthbert (q.v.). The cathedral suffered severely from the ravages of the Danes, and was gradually allowed to fall into rains as Durham grew into importance. In August 1887 three thousand barefooted pilgrims erossed the sands to Lindisfarne. See works by G. Johnston (1853) and F. R. Wilson (1870).

Holy Land. Sec PALESTINE.

Holyoake, George Jacon, a zealons labourer for bettering the condition of working men, a writer on co-operation, and the founder of 'Secularism, a system which bases duty on considerations purely lumnan, relies on material means of improvement, and justifies its beliefs to the conscience, irrespective of atheism, theism, or revelation.' He was born at Birmingham on 13th April 1817. During the

course of his life he has filled various offices and taken an active share in various public movements. He taught mathematics at the Mechanics' Institution in Birmingham, lectured on Robert Owen's socialist system, acted as secretary to the British contingent that went to the assistance of Garibaldi, edited the *Reasoner*, was chiefly instrumental in getting the bill legalising seenlar affirmations passed, projected the light on the clock tower of the Parliament House, and exerted himself on behalf of settlers in Canada and the United States, services recognised by Mr Gladstone and the Canadian government. Holyoake was the last person imprisoned in England on a charge of atheism (1841). He was president of the Carlisle Congress of the Go-operative Societies, 1887. On the subject of co-operation he has written History of Co-operation in Rochdale (2 parts, 1857-72), History of Co-operation in England (2 vols. 1875-79; new ed. vol. i. 1886), and Self-help a Hundred Years Aga (1888). Other works from his pen are The Limits of Atheism (1861), Trial of Theism (1877), Life of Joseph Rayner Stephens (1881), Hostile and Generous Toleration, a History of Middlesborough, Sixty Years of an Agilator's Life (1890), &c.

Molyoke, a city of Massachusetts, 8 miles N. of Springlield, on the Connectient River, which is here crossed by a dam over 1000 feet long and falls 60 feet in less than a mile, supplying immense water-power. Holyoke is a great seat of the paper-making trade, and has a score of paper-mills, besides numerous cotton-factories and woollen-mills, several grist-mills, and manufactures of metal and wooden wares. It contains a fine city-hall of granite, and a large number of excellent schools. Pop. (1870) 10,733; (1885) 27,894.

Holy Roman Empire. See Roman Empire, Church History.

In the year 1128 King David I, of Scotland founded at Edinburgh an abbey of canons regular, of the order of St Angustine. According to the legend, it was founded on the spot where the king, whilst hunting on Road Day in the fourth year of his reign, in the forest that then surrounded Edinburgh, was thrown from his horse and nearly gored by a lart, and was only saved by a mysterious hand putting a flaming cross between him and the animal, at the sight of which the hart fled away, leaving the king safe. The alboy was dedicated to the Holy Cross or Road, a casket of gold, elaborately wrought and shaped like a cross, which was brought to Scotland by Margaret, wife of Malcolm, king of Scotland, about 1070. This casket was held in great veneration as containing a splinter of the true Cross, and became one of the heirlooms of the kingdom. The Black Road of Scotland, as it was called, was carried before the army of David II. when he invaded England in 1346, and fell into the hands of the English at the battle of Nevillo's Cross. The victors placed it in the shrine of St Cuthhert in the cathedral of Durham. At the time of the Reformation it disappeared, and nothing has been known about it since. The abbey church was built in the Norman and early Gothie styles. The abbey was several times burned by the English, especially in 1544 (when the transcits were destroyed) and 1547. At the Reformation the monastery was dissolved; and the abbey church having been repaired was honceforth used as the parish church of the Canongate. In 1687 James VII., having built another parish church for the Canongate, converted the abbey church into the chapel by the mob at the Revolution in 1688, and romained in neglect until 1758. In that your it was repaired

and roofed; but the roof was too heavy for the walls, and it fell in 1768. Since then the chapel has been left in a state of ruin. The vault, built as a burying-place for the royal family of Scotland, contained the ashes of David II., James II., James V., and of many other royal and historical personages, such as the Duke of Allany, Lord Darnley, &c.

The abbey of Holyrood early became the occasional abode of the Scettish kings. Robert Bruce and Edward Baliol beld parliaments within its walls. James II. was born in it, crowned in it, married in it, buried in it. The foundations of the palace, apart from the abbey, were hid about 1501 by James IV., who made Edinburgh the capital of Scotland. Henceforth Holyrood Palace was the chief seat of the Scottish sovereigns. It was mostly destroyed by the English in 1544, but immediately afterwards rebuilt on a larger scale. Queen Mary took up her abode in the palace when she tehrned from France in 15th. Here, in 1566, Rizzio was torn from her side and murdered. It was garrisoned after the battle of Dunbar in 1650 by Cromwell's troops, who burned the greater part of it to the ground. It was rebuilt by Charles II., from the designs of Sir William Bruce of Kinross, between 1671 and 1679. After the accession of James VI. to the throne of England it ceased to be occupied as a permanent royal residence. But George IV, held his court in it in 1822, and Queen Victoria occasionally spends a night within its walls. At the present day the disposition of the rooms in the dider portion scenns to be much the same as in the time of Queen Mary. The picture-gallery, containing badly-painted 'portraits' of falmlous Scottish kings, and a few genuine works of art, possesses romantic interest as the seene of the balls and receptions of Prince Charlie in 1745.

The palace, with its precinets and park, was in Catholic times a sanctnary for all kinds of offenders, but afterwards the privilege of Sanctnary (q.v.) was extended to none except insolvent debtors. De Quincey is the most illustrious person who availed himself of the privilege. But now, from recent amelioratious in the laws affecting debtors, especially the Debtors (Scotland) Act, 1880, the protection has no longer legal validity. See Historical Description of the Monastery and Chapel Royal of Heliprood House (1819), and D. Wilson, Memorials of Edinburgh (1848).

Holy Sepulchre, KNIGHTS OF THE, an order of knighthood instituted, probably by Pope Alexandor VI., for the gnardianship of the Holy Sepulchre, and the relief and protection of pilgrims. On the recapture of Jerusalem by the Turks the knights retired to Italy, and settled at Perugia, After a temporary union with the Hospitallers, the order was reconstituted in 1814 both in France and in Poland.

Holy Water, in the Roman Catholic, as also in the Greek, Russian, and oriental churches, signifies water blessed by a priest or bishop for cortain religious uses. Water is, almost of its own nature, a litting symbol of purity; and accordingly, in most of the ancient religious, the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the purity water in the purity in the personal acts of sanetilleation prescribed to individuals. The Jewish law contained many provisions to the same effect; and our Lord, by establishing baptism with water as the necessary form of initiation into the religion instituted by him, gave his sanction to the use. The usage of sprinkling the hands and face with water before entering the sanctuary, prescribed in the Jewish law for those ceremonially unclean, was very early adopted in the Christian church. It is expressly mentioned by

Tertullian in the end of the 2d century. And that the water so employed was blessed by the priests we learn from St Jerome, among others, and from the Apostolical Constitutions. Although it is difficult to fix the precise time, it eannot be doubted that the practice of mingling salt with the water is of very ancient origin. In the Western Church there is a solenn blessing of water in the service of Holy Saturday, but the eeremonial is repeated by the priest whenever necessary. Holy water is placed in Benitiers (q.v.) at the doors of churches that worshippers may sprinkle themselves with it; before high mass on Sundays the eelebrant sprinkles the people with holy water; and it is used in nearly every blessing given by the church. Instructed Catholics regard the use of holy water chiefly as a means of suggesting to the mind the necessity of internal purity; and although it is supposed to derive from the blessing a special efficacy for this end, yet this efficacy is held to be mainly subjective and of a character entirely distinct from that ascribed to the sacramental rites of the church. See Beneriction.

Holy Week, the week immediately preceding Easter, and specially conscerated to the commemora-tion of the Passion of our Redeemer. This institution of the Passion of our Redeemer. This institu-tion is of very early origin, and the name Holy Week is but one of many by which its sacred character has been described. In English use it is called 'Passion Week' (a name appropriated, in Roman use, to the week before Palm Sunday). It was also called the 'Great Week,' the 'Silent Week,' the 'Week of the Holy Passion,' the 'Vacant Week,' the 'Penitential Week.' In the Roman Catholic Clurch the special above to existing Roman Catholic Church the special characteristics of the eelebration of the Holy Week are increased solemnity and gloom, penitential rigour, and monintherein, it is deferred till after Easter. All in-strumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and images are veiled from public sight; manual labour, although it is no longer entirely prohibited, is by many persons voluntarily suspended; the rigour of fasting is redoubled, and alms-deeds and other works of mercy sedulously enjoined and practised. All church services of the week, moreover, breathe the spirit of mourning, some of them being specially devoted to the commemoration of particular scenes in the Passian of our Lord. The particular scenes in the Passian of our Lord. The days thus specially solemnised are Palm Sunday, Spy Wednesday, Holy (or Maundy, q.v.) Thursday, Good Friday (q.v.), Holy Saturday. Holy Thursday in the Roman Catholic Charch is specially designed as a commemoration of the Last Supper, and of the institution of the encharist, although there are several other features peculiar to the day. To Holy Saturday belongs the solemn blessing of five and of the water of the baptismal font; and from the earliest times it was set apart for the baptism of catechumens, and for the ordination of eandidates for the ecclesiastical ministry. From the 'new fire,' struck from a flint, and salemnly blessed on this day, is lighted the Paschal Light, which is regarded as a symbol of Christ risen from the dead. This symbolical light is kept burning during the reading of the gospel at mass throughout the interval between Easter and Pentecost. It must be added, however, that in many instances the primitive institution of the Holy Week was perverted, and that the suspension of labour, which was originally designed for purposes of devotion and contemplation, was turned into an occasion of amusement not unfrequently of a very questionable character. Such abuses are now universally discountenanced by the ecclesiastical authorities. Sec Fasts, Festivals.

Holywell (Welsh Treffynnon), a parliamentary borough and market-town of Flintshire, North Wales, on an entinence 15 miles NW. of Chester, It is the seat of numerons lead, iron, copper, and zine mines, and has smelting-works for the extraction of these metals, manufactures of paper, flannel, and Roman ecunent, and tanyards and breweries. The borough unites with those of Flint, Mold, &c. in returning one member to parliament. Pop. (1851) 5740; (1881) 7862. Holywell owes its origin to the renowned well of St Winifred, which, until diminished by drainage works, was estimated to deliver 4700 gallons of water per minute. The Perpendicular chapel over the well is attrillated to Margaret, mother of Henry VII. It is still a place of pilgrinage for Roman Catholies. See Pennant's History of Holywell (1796).

Homage (Old Fr.; Low Lat. homaticum: Lat. homo, 'man') is the service due from a knight or vassal to his lord in fendal times, the vassal professing to become his lord's man. See FEUDALISM.

Homburg, or Homburg vor den Home, a town in the Prussian province of Hesse-Nassan, is situated at the foot of the Tamms Mountains, 8 miles NNW of Frankfort-on-the-Main. It has beautiful environs, and is frequented by about 12,000 visitors annually on account of its mineral waters. The springs, five in number, possess saline and chalyheate properties. They are considered effective in cases of disordered liver and stomach, fur hemorrhoidal and menstmal disaders, and for gout, rhenmatism, scrofula, and skin diseases. About 400,000 hattles are sent away annually. The gaming-tables were suppressed in 1872. Pop. (1875) 8294; (1885) 8663. See works by Schick (14th ed. 1885) and Will (1880).

Home, the name of one of the aldest and most celebrated of the historic families of Scotland. After the Conquest Cospatrick, the great Earl of Northumberland, took refuge in Scotland, and received from Malcolm Cammore the manur of Dunbar, and large estates in the Merse and the Lottians. Patrick, the second son of the third Earl of Dunbar, inherited from his father the manor of Greenlaw, and having married his cousin, daughter of the fifth earl, obtained with her the landof Home, from which his descendants took their designation. After the overthrow of the earls of Dunbar and March in 1436 the Homes succeeded to a portion of their vast estates and to a great deal of their power on the eastern Marches. Sir Alexander Home was created a peer by James III.; but, disappointed in his attempt to appropriate the revenues of Coldingham Priory, he joined the disaffected nobles who rebelled against James, and took part in the battle of Sauchieburn, where the king was killed. The second baron obtained estates and important offices from James IV. Along with Lord Huntly he commanded the vanguard of the Scottish army at Flodden, and routed the English right wing. He was almost the only Scottish noble who returned unburt from that battle. He was induced by fair promises from the Regent Albany to visit Holyrood along with his brother William in 1516, and they were arrested, tried for treason, and condemned and executed. The fortreason, and condemned and executed. fcited title and estates were restored to his brother George in 1522; but, though the family took a prominent part in public affairs during the troublons prominent part in prome anatis are again times of Queen Mary and the great civil war, they never regained their former influence. extensive estates dwindled down to a patrimony of 2000 acres, and they sank into insignificance. But the marriage (1832) of the eleventh earl to the heiress of the Douglas estates restored the decayed fortunes of this ancient house. These estates now,

according to the Doomsday Book, yield a rental of £47,721 a year.

Home, Daniel Dunglas, spiritualist, was born near Edinburgh, March 20, 1833, and was taken by an aunt to the United States, where by 1850 he had become a famous medium. He began the study of medicine, but was persuaded by his friends to practise spiritualism instead; and in 1855 he removed to London to carry on his 'mission,' Home was a proficient in mesmorism and such-like sciences, and to table-turning and spirit-rapping be added, for advanced disciples, speaking ghosts, and a display of his own powers of floating in the air. He made many converts, though not all the great people be claimed. He was presented at several courts, and to the pope; and he joined the Roman Catholic Church, but was ultimately expelled for spiritualistic practices. In 1866 lie acceded to a Mrs Lyon's suggestion that he should become her adopted son, she assigning to him 160,000; but this money his fielde patroness afterwards compelled him to restore, and the lawsuit discredited Home greatly, though he was scarcely to blame in the matter. He died at Antenil, 21sh June 1886. He published two series of Incidents of of the fisher and 1872), and Lights and Shadows of Spiritualism (1877); see also D. D. Home: his Life and Mission (1888), and a continuation, The Gift of D. D. Home (1890), both by his widow.

Home, HENRY. See KAMES (LORD).

Home, John, a Scotch elergyman and dramatist, was born at Leith in 1722. He graduated at the Edinlargh University in 1742, and three years later entered the clarch. He was present as a volunteer on the king's side when the royalists were routed by the young Pretender at Falkirk, and was carried a prisoner to the eastle of Donne, whence he effected his escape. In 1746 he was appointed minister of Athelstaneford, near Haddington, where he produced in 1749 the tragedy of Africa, and, after the lapse of five years, Dougles, a tragedy founded the fore the publication of Percy's Reliques) on the ballad of Gil Morrice. Each of these plays was successively rejected by Garrick; but Donglas, brought out at Edinburgh, met with instant and brilliant success, and evoked equal onthusiasm when placed on the London boards. Its production, however, gave such offence to the Presbytery that the author thought lit to resign his ministry, and, withdrawing into England, he became private secretary to like Earl of Bute, who procured him a pension of £300 a year. Bate, who procured him a pension of £300 a year. The success of *Douglas* induced Garrick not only to accept Home's next play, *The Siege of Aquileia*, but to bring out the earlier work, *Agis*. Home's other works are *The Fatal Discovery*, *Alonzo*, *Alfred*, occasional poems, and, in prose, *A History of the Rebellion of 17.45*. He died in 1808.

Home is the last of our tragic poets whose works for any time held the stage. The drama, purified from the licentionsness of Wycherley and Congreve, had become frield and lifeless in the hands of Addi-

had become frigid and lifeless in the hands of Addison, Rowe, and Johnson, and the cuthusiasm with which Douglas was greeted was due to the generous warmth of domestic feeling, the chivalrous ardour and natural pathos which Home infused into his work. His writings are remarkable for the interesting character of their plats, for lucidity of language, and for occasional flashes of gennine neetry; but he did not succeed in entirely discarding the pompons declaration of his forerunners. In his day he enjoyed the praise of all and the friendship of the most distinguished; Collins dedicated to him his ode on the Highland superstitions, and Burns, with more zeal than judgment, said that he

Methodised wild Shakespeare into plan

The taste of his time is not that of ours, but the two generations.

dramatists who displaced him turned to comedy, and he has had no successor of equal fame. See the Life hy Henry Mackenzie, prefixed to his works (3 vols. 1822).

Home Counties, the counties over and into which Landon has extended-Middlesex, Hertfordshire, Essex, Kent, Surrey. The south-eastern circuit (see Assize) is still sometimes called the 'Home Circuit,' though it includes, besides the home counties (except Middlesex), also Cambridgeshire, Norfolk, and Suffolk.

Homelyn. See Ray.

Home Office. See SECRETARY OF STATE.

Homer. The poems of Homer differ from all other known pactry in this that they constitute in themselves an encyclopædia of life and knowledge; at a time when knowledge, indeed, such as lies heyoud the bounds of actual experience was extremely limited, but when life was singularly fresh, vivid, and expansive. The only poems of Homer we possess are the *Iliad* and the *Odyssey*, for the Homeric Hymns and other productions lose all title to stand in line with these wonderful works, by reason of condict in a multitude of particulars with the witness of the text, as well as of their poetical inferiority. They evidently belong to the period that follows the great migration into Asia Minor

brought about by the Dorian conquest.

The dictum of Heradotos which places the date of Homer 400 years before his own, therefore in the 9th century B.C., was little better than more conjecture. Common opinion has certainly presumed him to be posterior to the Dorian conquest. The Hyun to Apolla, bawever, which was the main prop of this opinion, is assuredly not his. In a work which attempts to turn recent discovery to account, I have contended that the fall of Troy cannot properly be brought lower than about 1250 B.C., and that Homer may probably have lived within fifty years of it (Homeric Synchronism,

1. vi.).
The entire presentation of life and character in the two poems is distinct from, and manifestly anterior to, anything made known to us in Greece under and after that conquest. The study of Homer has been darkened and enfeebled by thrusting backwards into it a vast mass of matter, belonging to these later periods, and even to the Roman evilisation, which was different in spirit and which entirely lost sight of the true position of Greeks and Trojans, and inverted their moral as well as their martial relations. The name of Greeks is a Roman name: the people, to whom Homer has given immortal fame, are Achaians both in designation and in manners. The poet paints them at a time when the spirit of national life was rising within their borders. Its first offerts had been seen in the expeditions of Achaian natives to conquer the Asiatic or Egyptian immigrants who had under the name of Cadmeians (etyphologically, 'foreigners') founded Thebes in Bootia, and in the voyage of the ship Argo to Colchis—which was probably the seat of a colony spring from the Egyptian amplitude and the colony spring from the Egyptian empire, and was therefore regarded as hostile in memory of the antecedent aggressions of that empire. The expedition against Troy was the beginning of the long chain of conflicts between Europe and Asia which end with the Turkish contents and with the Turkish contents. quests, and with the reaction of the last 300 years, and especially of the 19th century, against them. It represents an effort truly enormous towards attaining nationality in idea and in practice. Clearing away obstructions, of which the cause has been partially indicated, we must next observe that the lext of Homer was never studied by the moderns as a whole in a searching manner until within the last From the time of Wolf there

HOMER 755

was infinite controversy about the works and the authorship with little positive result, except the establishment of the fact that they were not written but handed down by memory-an operation aided and methodised by the high position of bards as such in (arcece (more properly Achaiis, and after-wards Hellas), by the formation of a separate school to hand down these particular songs, and by the great institution of the Games at a variety of points in the country. At these centres there were public recitations even before the poems were composed, and the uncertainties of individual memory were limited and corrected by competition carried on in presence of a people eminently endowed with the literary faculty, and by the vast national importance of handing down faithfully a record which was the chief anthority touching the religion, history, political divisions, and manners of the country. Many diversities of text arose, but there was thus in continual operation a corrective as well as a disintegrating process.

The Germans, who had long been occupied in framing careful monographs which contracted the contents of the Homeric text on many particulars, such as the Ship, the House, and so forth, have at length supplied, in the work of Dr E. Buchholz, a full and methodical account of the contents of the This work would fill in English not less than

six octavo volumes.

The Greeks called the poet poictes, the 'maker, and never was there such a maker as Homer. The work, not exclusively but yet pre-eminently his, was the making of a language, a religion, and a nation. The last named of these was his dominant idea, and to it all his methods may be referred. the first he may have been little conscious while he wrought in his office as a hard, which was to give

Careful observation of the text exhibits three powerful factors which contribute to the composipowerful lactors when contribute to the composi-tion of the nation. First, the Pelasgic name is associated with the mass of the people, entitivators of the soil in the Greek peninsula and elsewhere, though not as their uniform designation, for in Crote (for example) they appear in conjunction with Achaians and Dorians, representatives of a higher stock, and with Eleacretans, who were prohably anterior accupants. This Pelasgian name comably anterior occupants. This Pelasgian name commands the sympathy of the paet and his laudatory epithets; but is nowhere used for the higher class or for the entire nation. The other factors take the command. The Achaians are properly the ruling class, and justify their station by their capacity. But there is a third factor also of great power. We know from the Egyptian monuments that Greece had been within the sway of that primitive empire, and that the Phonicians were its maritime arm, as they were also the universal and apparently exclusive navigators of the Mediterranean. W hatever came oversea to the Achaian land came in connection with the Phoenician name, which was used by Homer in a manner analogous to the use of the word Frank in the Levant during modern times. But as Egyptian and Assyrian knowledge is gradually opened up to us we find by degrees that Phonicia conveyed to Greece Egyptian and Assyrian elements together with her own.

The rich materials of the Greek civilisation can almost all be traced to this medium of conveyance from the East and South. Great families which stand in this association were founded in Greece and left their mark upon the country. It is probable that they may have exercised in the first instance a nower delegated from Egypt, which they retained after her influence had passed away. Building, metal-working, navigation, ornamental arts, natural knowledge, all earry the Phoenician impress. This is the third of the great factors

which were combined and evolved in the wonderful nationality of Greece, a power as vividly felt at this hour as it was three thousand years ago. But if Phonicia conveyed the seed, the soil was Achaian, and on account of its richness that peninsula surpassed, in its developments of luman nature and action, the southern and eastern growths. Achainn civilisation was the result, full of freshness and power; in which n-age had a great sacredness, religion was a monal spring of no mean force, slavery though it existed was not associated with quelty, the worst extremes of sin had no place in the life of the people, liberty bad an informal but very real place in public institutions, and manners reached to much refinement: while on the other hand fierce passion was not abated by conventional restraints, slaughter and bondage were the usual results of war, the idea of property was but very partially defined; and, though there were strong indeterminate sentiments of right, there is no word in Homer signifying law. Upon the whole, though a very imperfect, it was a wonderful and noble nursery of manligod.

It seems clear that this first civilisation of the peninsula was sadly devastated by the rude hands of the Durian conquest. Institutions like those of Lycurgus could not have been grafted upon the Hameric manners; and centuries elapsed before there emerged from the political rain a state of things favourable to refinement and to progress in the Greece of history; which, though in so many respects of an unequalled splendom, yet had a less firm hold than the Achaian time upon some of the highest social and moral ideas. For example, the position of women had greatly declined, liberty was perhaps less largely conceived, and the tie between religion and morality was more evidently sundered.

After this sketch of the national existence which Hamer described, and to the consolidation of which he powerfully ministered, let us revert to the state in which he found and left the elements of a national religion. A close observation of the poems pretty clearly shows us that the three races which combined to form the nation had each of them their distinct religious traditions. It is also plain enough that with this diversity there had been antagonism. As sources illustrative of these propositions, which lie at the base of all true comprehension of the religion—which may be called Olympian from its central seat—I will point to the numerous signs of a system of Nature-worship as prevailing among the Pelasgian masses; to the alliance in the War be-tween the Nature-powers and the Trojans as against the loftier Hellenic mythology; to the legend in Iliad, i. 396-412, of the great war in heaven, which symbolically describes the collision on earth between the ideas which were locally older and those beginning to surmount them; and, finally, to the traditions extraneous to the poems of competitions between different deities for the local allegiance of the people at different spots, such as Corinth, to which Phænician influence had brought the Poscidon-worship before Honer's time, and Athens, which somewhat later became peculiarly the seat of mixed races. I have spoken of Nature-worship as the Pelasgian contribution to the composite In the Phonician share we Olympian religion. find, as might be expected, both Assyrian and Egyptian elements. The best indication we pos-Egyptian elements. sess of the Hellevic function is that given by the remarkable prayer of Achilles to Zeus in *Hiad*, xvi. 233-248. This prayer on the sending forth of Patroclos is the hinge of the whole action of the poem, and is preceded by a long introduction (220-232) such as we nowhere else find. The tone is monotheistic; no partnership of gods appears in it; and the immediate servants of Zens are described as interpreters, not as priests. From

756 HOMER

several indications it may be gathered that the Hellenic system was less priestly than the Troic. It seems to have been an especial priice of Homer to harmonise and combine these diverse elements, and his Theareby is as remarkable a work of art as the terrestrial machinery of the poem. He has prothe terrestrial machinery of the poem. He has pro-foundly impressed upon it the human likeness often called anthropomorphic, and which supplied the basis of Greek art. He has repelled on all sides from his classical and central system the cult of nature and of animals; but it is probable that they kept their place in the local worships of the country. His Zens is to a considerable extent a monarch, while Poscidon and several other deities hear evident marks of having had no superior at earlier epochs or in the countries of their origin. He arranges them partly as a family, partly as a commonwealth. The gods properly Olympian correspond with the Boule or council nuon earth; while the orders of less exalted spirits are only summoned on great occasions. He indicates twenty as the number of Olympian gods proper, following in this the Assyrian idea. But they were far from holding an equal place in his estimation. For a deity such as Aphrodite brought from the East, and intensely tainted with sensual passions, he indicates aversion and contempt. But for Apollo, whose cardinal idea is that of obedience to Zeus, and for Athene, who represents a profound working wisdom that never fails of its end, he has a deep reverence. asserts and distributes religious traditions with reference to the great ends he had to pursue; carefully, for example, septrating Apollo Irom the sm, with which he bears marks of having been in the sentence of the control of his other greater multiother systems identified. Of his other greater gols it may be said that the dominant idea is in Zens it may be said that the dominant idea is in Zenspolicy, in Here nationality, and in Poscidon physical force. His Trinity, which is conventional, and his Under-world appear to be borrowed from Assyria, and in some degree from Egypt. One licentions legend appears in Olympos, but this belongs to the Odyssey, and to a Phomician, not a Hellenic circle of idea. His Olympian assembly is, indeed, largely representative of human appetites, tastes, and passions; but in the government of the world it works as a body on behalf of justice, and the sumiliant as a body on behalf of justice, and the suppliant and the stranger are peculiarly objects of the care of Zens. Accordingly we find that the cause which is to triumph in the Trojan war is the just cause: that in the Odyssey the hero is led through suffering to peace and prosperity, and that the terrible retribution he inflicts has been merited by crime. Al various points of the system we trace the higher traditions of religion, and on passing down to the classical period we find that the course of the mythology has been a downward course.

The Troic as compared with the Achaian manners are to a great extent what we should now call Asiatic as distinguished from European. Of the great chieftains, Achilles, Diomed, Ajax, Menchos, and Patroclos appear chiefly to exhibit the Achaian ideal of humanity; Achilles especially, and on a colossal scale. Odyssens, the many-sided man, has a strong Pheenician tinge, though the dominant colour continues to be Greek. And in his house we find exhibited one of the noblest among the characteristics of the pocus in the sanctity and perpetuity of marriage. Indeed, the parity and loyalty of Penelope are, like the humility approaching to penitence of Helen, quite numatched in

antiquity.

The plot of the *Iliad* has been the subject of much criticism on account of the long absence of Achilles, the hero, from the action of the poem. But Homer had to bring out Achaian character in its various forms, and while the vustness of Achilles is on the stage every other Achaian hero must be celipsed. Further, Homer was an itinerating min-

strel, who had to adapt himself to the sympathies and traditions of the different portions of the country. Peloponnesos was the seat of power, and its chiefs acquired a prominent position in the Iliad by what in these grounds we may deem a skilful arrangement. But most skilful of all is the line adjustment of the balance as between Greek and Trojan warriors. It will be found on close inspection of details that the Achaian chieftains have in truth a vast military superiority; yet by the use of infinite art Homer has contrived that the Trojans shall play the part of serious and considerable antagonists, so far that with divine aid and connivance they reduce the foe to the point at which the intervention of Achilles becomes necessary for their deliverance, and his supremacy as an exhibition of cubosal manhood is thoroughly maintained.

The plot of the Odyssey is admitted to be consecutive and regular in structure. There are certain differences in the mythology which have been made a granud for supposing a separate authorship. But, in the first place, this would do nothing to explain them; in the second, they find their natural explanation in observing that the scene of the wanderings is laid in other hands, beyond the circle of Achaian knowledge and tradition, and that Homer modifies his scheme to neet the ethnical variations as he gathered them from the trading mavigators of Phomicia, who alone could have supplied him with the information required

for his purpose.

That information was probably coloured more or less by ignorance and by frand. But we can trace in it the sketch of an imaginary voyage to the unrhern regions of Europe, and it has some remarkable features of internal evidence supported by the facts, and thus pointing to its genuineness. In latitudes not described as separate we bave reports of the solar day apparently contradictory. In one case there is hardly any night, so that the shepherd might earn double wages. In the other, cloud and darkness almost shut out the day. But we now know both of these statements to have a hasis of solid truth on the Norwegian coast to the northward, at the different seasons of the midnight sun in summer, and of Christmas, when it is not

easy to read at noon. The value of Homer as a recorder of antiquity, as opening a large and distinct chapter of primitive knowledge, is only now coming by degrees into view, as the text is more carefully examined and its parts compared, and as other branches of ancient study are developed, especially as in Assyria and Egypt, and by the remarkable discoveries of Dr Schliemann at Hissarlik and in Greece. But the appreciation of bim as a poet has never failed, though it is disappointing to find that a man so great as Aristophanes should describe bin simply as the hard of battles, and sad to think that in many of the Christian centuries his works should have shunbered without notice in bidden repositorics. His place among the greatest poets of the world, whom no one supposes to be more than three or four in number, bas never been questioned. Considering him as anterior to all literary aids and training, he is the most remarkable phenomenon among them all. It may be well to specify some of the points that are peculiarly bis own. One of them is the great simplicity of the structure of his mind. With an incomparable eye for the world around him in all things great and small, he is abhorrent of everything speculative and abstract, and what may be called philosophies have no place in his works, almost the solitary exception being that he employs thought as an illustration of the rapidity of the journey of a deity. He is, accordingly, of all poets the most simple and direct. He is also the most free and genial in the movement of

his verse: grateful nature seems to give to him spontaneously the perfection to which great men like Virgil and Milton had to attain only by effort intense and sustained. In the high office of drawing human character in its multitude of forms and colours he seems to have no serious rival except Shakespeare. We call him an epic pact, but he is instinct from beginning to end with the spirit of the drama, while we find in him the seeds and indiments even of its form. His function as a reciting minstrel greatly aided him herein. Again, he had in his language an instrument unrivalled for its facility, suppleness, and versatility, for the large range of what would in masie be called its register, so that it embraced every form and degree of human thought, feeling, and emotion, and clothed them all, from the lowest to the loftiest, from the slightest to the most intense and concentrated, in the dress of exactly appropriate style and language. His metre also is a perfect vehicle of the language. Its most think the range of his knowledge limited, yet it was all that his country and his age possessed, and it was very greatly more than has been supposed by readers that dwelt only on the surface. So long as the lump of civilisation shall not have ceased to burn, the *Hiad* and the *Odyssey* must hold their forward place among the brightest treasures of our

It is impossible to give any satisfactory account of the Homorio hibliography, not only from its extent, but from the fragmentary manner in which for the most part the subject has been handled, and through the rapid exten-sion of the field by the importation of new knowledge son of the field by the importation of new knowledge from sources apparently remote, which brings with it new lights. The works of Blackwell and Wood, the latter of which attained to celebrity, will show how slender was the apparently criticus of their time. Thirlwall, Grote, and Mitford, who is now antiquated, contain good ideas, but Grote condemns as pure myth or fable much that is now gradually taking historic form, and viviseets the Bland by resolving it into an Achilleis and an Ilias. The first English writers who indicated a study of the text at first English writers who indicated a study of the text at once comprehensive and appreciative were Keble in his Predectiones Poction, and Colonel Mure in his History of the Literature of Greece. Mr Robert Brown's Poseudon is a good example of method in tracing the origin of the Olympian delties. Nagelsbach rendered an essential service by dividing for the first time the Homerische from service by dividing for the first time the Homerische from the Nuchhomerische Theologie. Mure fiest, I think, taught the need of large and careful collection of matter from the text; and this process has been carried to its con-summation by Dr Inchholz of Berlin, whose collection of the readien or contents of the poems must have been the work of at least twenty years. This, however, is a meagre notice of a literature which might of itself form the study of a life.

the study of a life,
EDITIONS: Dindorf; Nanck; Bekker; La Rocho;
Amels; Monro (Riad); Paley (Riad); Leaf (Riad);
Morry (Odyssey); Hayman (Odyssey). DIALECTS, GRAMMARS, DICTIONARIES, CONCONDANCES, &c.: Delbrick's
Syntactische Forschungen; Monro's Homeric Grammar;
Eddadische Forschungen; Monro's Homeric Grammar; Diderlein's, Auteurieth's, and Ebeling's Dictionaries; Liddell and Scott, capital for Homer though not Homeric ex professo; Prendergast's Concordance to the Riad; Dunbar's Concordance to the Riad and the Hymns; Seberus, Index Homericus. Hulp-Books: Nagelshach's Homerische Theologie; Gladstone's Studies on Homer, Primer, and other Romeric works; Jebb's Introduction Primer, and other Homeric works; Jebb's Introduction to Homer; Matthew Arnold's Lectures on Translation of Homer. Thanslations into English: Iliud (verse)—Chapman, Pope, Cowper, Lord Derby, Blackie, Worsely and Conington, Way, Wright, Green; Iliud (prose)—Leaf, with Myers and Lang; Odyssey (verse)—Pope, Chapman, William Morris, Worsley, Lord Carnarvon, Way, Schomborg, 'Avin;' Odyssey (prose)—Butcher and Lang. For information on various matters connected with Homer and the Homeric poems, see the articles in this work on Achilles, Helen, Troy, Ulysses, &c.; also Greece, Yol, V. p. 300.

Home Rule. See Ireland.

Home Rule. See IRELAND.

Homestead. By the Homestead Act of 1862 every citizen of the United States, native or natural-

ised, who has reached the age of twenty one years, or is the head of a family, is entitled to claim onequarter section (160 acres) of any of the public lands that are surveyed and otherwise unappro-priated. The sole condition attaching to what is is five years' residence upon the property, something of course being done to improve it. A title is then granted by the general land office in Washington. Except in the case of non-payment of the moderate registration and other fees, the homestead is absolutely exempt from forced sale for debt; the abject of this provision being to guard the interests of women and children, the marriage contract, carrying with it a promise of support, being held to take precedence of any other agreement a lin-band or father can enter into. The limit of the value of homesteads to exempted differs in the various states: in Illinois it is \$1000, in Wisconsin \$5000. Pre-emption.

Homicide. See Manslaughter, Murdur; and for homicidal mania, Insanity.

Homildon Hill, a battlefield in Northmulerland, 1 mile NE, of Wooler. In 1402 Earl Donglas at the head of 10,000 Scots had rayaged England as far as Newcastle, and was returning laden with booty, when on 14th September he was intercepted booky, when on 14th september he was intercepted by an English army under Hotspur and the exiled Earl of March and Dunbar, so posted himself upon Homildon (Humbleton) Hill. Hotspur was eager for a headlong charge, but, by March's advice, the bownen were set to play upon the Scots, who 'stood long like deer in a park to be butchered,' and, too late descending to come to close quarters, sustained an irretrievable defeat. Douglas himself was wounded in five places, and was taken prisoner, with four other earls, two barons, and eighty knights. See HENRY IV.

Honrily (Gr. homilia) primarily signifies a discourse held with one or more individuals, but in ecclesiastical use it means a discourse held in the church. The practice of explaining in a popular form the lessons of Scripture read in the synagogues had appeared to have had prevailed among the Jews, and appears to have been adopted in the Christian churches from the earliest times; but we have no sample of this form of composition earlier than the homilies of Origen in the 3d century. The early Christian homily may be described as a popular exposition of a portion of Scripture, accompanied by moral reflections and exhortations. It differs from the sermon (Gr. logos, Lat. oratio) in following the order of the scriptural text or narrative, instead of being thrown into the form of a thetorical discourse or a didactic essay. The name homily is, however, very frequently used almost as a synonym for sermon; and Homiletics is that branch of theology which deals with the rules for composing sermons and discourses of any kind, sometimes called 'sacred rhetoric.' Ancient collections of homilies or hamiliaria are very numerons; the most notable being that compiled about 782 hy Paulus Diacouns, under Charlemagne's authority

The Homilies of the Church of England are a collection of sermons, the first part of which was published in 1547, the first year of the reign of Edward VI., to be read in the churches, partly in order to supply the defect of sermons, but partly, also, to secure uniformity of doctrine, and to guard against the leterodoxies, old and new, which at that time threatened the unconsolidated church. The second part was published in 1562, at the same time with the Articles, under Elizabeth. The 35th Article declares that 'the Book of Homilies doth contain a godly and wholesome doctrine, and necessary for these times. The titles are enumerated in the article, and are twenty one in number. The

homilies are not now read in churches; but there is no law to prevent their being so read, and they are frequently appealed to in controversies as to the doctrine of the Anglican Church on the paints of which they treat. The precise degree of anthority due to them is matter of doubt.

Hominy, a preparation of maize, coarsely ground and boiled; a kind of Indian corn porridge.

Homocercal. See HETEROGERGAL

Homocopathy (homoion, 'like;' puthos, 'disease'), a medical doctrine, which teaches that diseases should be treated or cured by drugs capable of producing similar symptoms of disordered health to those presented by them; or, as it is commonly phrased, 'likes should be treated by likes,' or let likes be enred by likes—similar similians curentur.

The earliest mention of this doctrine occurs in one of the books attributed to Hippmerates, who taught that some diseases were cared by similars and some by contraries. He illustrated the former by pointing to mandrake as a cure for mania; 'give the patient,' he says, 'a draught made from the root of mundrake in a smaller dose than is sufficient to produce mania.' Reference is also made to cient to produce mania. Reference is also made to the doctrine of similars by several medical authors during the centuries that followed. In 1738 Stahl, a Danish army surgeon, wrote that 'the rule generally acted upon in medicine to treat by means of oppositely ucling remedies is quite false, and the reverse of what ought to be; I am, on the contrary, convinced that diseases will yield to and be enred hy remedies that produce a similar affection.' The celebrated Von Stöerck, in 1762, arged the same rule as a reason for using stramonium in insaulty. Though impressed with the importance of this doctrine, these writers took no steps towards rendering it available in the practice of medicine. do this was reserved for Samuel Halmemann (q.v.), who, in 1798, in an essay entitled 'Saggestions for ascertaining the Curative Powers of Drugs,' published in Hufeland's Journal, then the leading medical periodical of Europe, showed, as the result of a series of researches and experiments extending over six years, that in this doctrine lay the key to the selection of specifically acting medicines; of medicines, that is, which care by exercising a direct influence upon the parts diseased, as distinguished from those which relieve by what is termed their 'derivative' action. For example, it was then, and is now, customary to endeavour to control congestion of the brain by pargutives, by medicines operating not on the brain but upon the bowels. Halmemann, on the other hand, asserted that congestion of the brain was most quickly and certainly enred by prescribing small doses of a medicine which previous experiment had proved to more influence upon the circulation in that organ—a direct method. The meture of this influence, he would be one of similarity. This vious experiment had proved to have a special further showed, must be one of similarity. This similarity was, he painted out, recognised by the symptoms indicating the nature of the disease-process on the one hand, and those marking the action of the drug when taken by persons in ordinary health on the other.

This doctrine, then, applies solely to that part of the treatment of disease which relates to the use of medicines; and further, it is restricted to prescribing medicines in diseases which are not dependent for their existence on some mechanical cause, such as the presence of a mass of undigested food in the stomach, or of a stone in the hladder. To those parts of treatment which are concerned with nursing, dieteties, hygiene, the use of water in various ways, electricity, massage, &c., homompathy, as such, hears no reference; though those physicians who have adopted it attach great importance to

these therapentic measures. Homoopathy has solely to do with the selection of drugs when these are needed for directly curative purposes—a sufficiently wide range truly! Hubmemann's claims to distinction as a therapentist rest not merely on his having recognised this doctrine as a rule of drugselection in a wide range of diseases—this had been done to some extent by others, as he himself has admitted—but upon his having rendered it possible to apply it in practice; as he wrote in 1810, 'no one has as yet tanght this homoeopathic therapentic doctrine.' If it were true that the symptoms evoked by a drug should regulate its employment in disease, the symptoms which drugs will cause must needs be ascertained. Hence the study of drugs by making experiments with them upon healthy persons—drug-proving, as it is termed—became a cardinal point in the teaching of Halmemann. It forms, indeed, the first maxim of homoopathy.

Enrither, if a medicine is to be used that will produce a condition like that which it is intended to enre, it is obvious that it must be prescribed in a dose smaller than that in which it is capable of producing such a condition. This much was clear to Halmemann when he first applied homeopathy at the badside. During the first three or four years of his doing so he used doses of from three to four grains of such medicines as mux vonica and veratum powder; of armica powder he gave 'a few grains;' of ignatia, from three to seven grains, and so on. As his experience in the use of medicines upon this basis increased he found that far more minute doses than these were all-sufficient, and in 1806 he writes of his giving hundredths, thousandths, and millionths of the quantities required to obtain the antipathic or allopathic action of a drug. In graduating his doses Halmemann followed where his experience seemed to lend him, his one desire apparently being to give no more medicine than was absolutely necessary for the enre of disease.

What is the safest, snrest, and best dose in which to prescribe a homoropathically chosen medicine is a question upon which there is a great difference of opinion among those who have studied the subject. The only principles upon which there is any unanimity among them are that the dose to enre must be smaller than that which will produce a condition like that to be treated, and that different persons ure susceptible to the influence of widely differing doses. The necessity for the dose being a small one is the **serond** maxim of homeopathy. The third is that medicines must be prescribed in the form in which they were taken when 'proved'-i.e. when the experiments were made which revealed the kind of action they have upon healthy persons. This is essential, because, however well acquainted such experiments may render the physician with medicines individually, they teach him nothing of what the action of such medicines will be when combined with one or more others. He has no means of ascertaining what would be the influence exercised upon the action of his 'base' by the 'corrective' or the 'adjuvant' of the ordinary prescription combination of drugs.

To account for or explain the modus operandi

To account for or explain the modus operandi of a homeopathically selected medicine several theories have been advanced. Halmemann put forward one which, however, he at the same time declared that he regarded as of no importance. So far no explanation hitherto attempted has met with any general acceptance from those who admit the trith of the doctrine. It is as an ultimate fact in therapenties, the reality and value of which can anly be ascertained by putting it into practice at the bedside, that homeopathy has always been regarded, rather than as a speculative idea to be

demonstrated or refuted by theoretical discussions or a priori arguments. Hence it is to the results of experience in employing homocopathically selected medicines, especially in epidemics notoriously attended by a great mortality under the usual methods of treatment, that those who advocate this

method appeal to sustain their position.

For example, in 1836 cholera was devastating Anstria, when a petition was presented to the Anstria, When a petition was presented to the government to allow homopathy to be tested. Dr Fleischmann was accordingly ordered to fit up a hospital in the Gumpendorf suburb of Vienna for the reception of cholera patients to be treated homogopathically. The result showed that whereas 70 per cent, of those treated in the ordinary way

died, Dr Fleischmann lost only 33 per cent.

Again, in yellow fever, in 1878 the American
Institute of Homoopathy appointed a commission, consisting of physicians who had had experience in dealing with this disease, to ascertain the number of cases treated homosopathically during the epidemic of that year, and the rate of mortality amongst them. The report showed that in and around New Orleans 3914 cases were treated, with a loss of 261, being a mortality of only 6.6 per cent.

in this singularly fatal form of disease.

Lastly, in the city of Melbourne typhoid fever recurs in opidemic form every year. The Melbourne Herald of April 20, 1889, gave the following hospital statistics of typhoid for three seasons. During these three epidemics the Melbourne hospital, with 318 beds, received 1182 cases of typhoid, of which 181, or 15 31 per cent., died. The Alfred Hospital, with 144 hods, admitted 998 cases; of these 135, or 13 52 per cent, were fatal. The Homospathic Hospital, with 60 hods, received 554 cases, of which

49, or 8.84 per cent., died.

Another argument in support of the contention that homoopathy affords a real basis on which to select a medicine is drawn from the fact that Hahnemann, when appealed to in 1832 to suggest the medicines most likely to be useful in cholera, without ever having seen a case, but merely from studying the symptoms of some that were reported to him, and comparing these symptoms with those produced by medicines he had experimented with, named camphor, copper, and white hellebore as the remedies; and these, with the single addition of arsenic, have since been found to be more serviceable in checking the disease than any others. It is consequently neged that for a principle of drug-selection to enable the physician to indicate before-hand the appropriate romedy in an entirely new form of disease is a strong proof of its truth, and

evidence of its value.

Finally, homeopathists contend that the unacknowledged adoption of many of the practical results of their teaching by physicians who professelly repudiate homoeopathy is an additional proof that this teaching is sound. The text-books on Materia Medica which are now most popular in the medical schools, the Handbook of Therapenties, by Dr Sidney Ringer, and Dr Lauder Brunton's Meteria Medica, Pharmacology, and Therapentics, abound with recommendations for the use of medicines in diseases in which they were first known to bo of service through homocopathy. Of these, the use of acouste in inflammatory fever is one of the most conspicuous. That it would be found capable of reducing the fever with which acute inflammations are usually ushered in was an inference drawn by Halmemann from the experiments that he had made with it; and, when publishing his conclusion, he foretold that it would entirely supersede the necessity for blood-letting, then so constantly employed in such cases. It was the endorsement of this statement by Dr Uwins—who had to some extent tested the worth of homocopathically

selected medicines-at a meeting of the London Medical Society in 1836 that so shocked the members present as to induce them to pass a resolution precluding all reference to homoopathy at any future meeting. To use aconite in small doses in acute inflammatory fever is thoroughly homeo-pathic, and is at the same time a very common practice now among those who deny that homeopathy is of any value to the physician. Many other medicines there are that are very generally used by apponents of homocopathy in conditions to which they are homoopathic, and in which they were originally made known to be useful by those who practise homoopathically; such, for example, as arsenic in gastric irritation, ipecacnanha in vomiting, corresive sublimate in dysentery, bella-

donna in quinsy, &c.

While homeopathists accept these appropriations as so many tributes to the truth of their doctrine, and look upon them as important advances in therapenties, at the same time, in the absence of any knowledge on the part of those who use them of the doctrine which led to their employment, they regard them as calculated to give rise to disappointment in some instances. They do so for the pointment in some instances. They do so for the reason that all cases of a given form of disease are not so precisely similar as to admit of cure by the same medicine. Thus, to give belladonna in all quinsies, while of advantage in many, would be useless in some, because all cases of quinsy do not rescrible that produced by belladonna. Some are more like that occasioned by mercury, others that of the poison of the honey-bee, or of one of the serpent poisons, others that of the Phytolaxca de-candra, and so on; and it is, the homeopathist argues, only when the doctrine of homeopathy is strictly adhered to in each individual instance of a disease that that success which he contends will follow his method can be looked for

From the date of the publication of Hahnemann's first essay on Homoopathy the opposition this doctrine has met with from the great majority of the profession in Great Britain has been of the most determined and persistent character. Of late years the intensity of the bitterness of feeling which this controversy aroused has been somewhat mitigated, or perhaps the influence of public opinion has pre-vented its indulgence to the same extent as formerly. The last attempt to deprive a physician of his hospital appointment on the ground that he was treating his patients homographically failed, while several open adherents of this doctrine are to be found holding public health and poor-law appointments. The number of those who in Great Britain admit that they practise homeopathy has never at any one time exceeded 300. The chief hospital where homeopathy is practised is the London Homeopathic (1850), with ninety beds and a large ont-patient department. There are similar institutions at Birmingham, Liverpool, Bath, Plymouth, Bonrnemouth, Eastbourne, and Bromley; and a convalescent home in connection with the London Hospital has recently been opened at Eastbourne found holding public health and poor-law appoint-Hospital has recently been opened at Eastbourne. In addition to these there are about a hundred homocopathic dispensaries in different parts of the country.

In the United States of America, where public opinion is more powerful than professional feeling, homocopathy has spread rapidly and widely, and it is estimated that nearly one fourth of the qualified practitioners of medicine in that country have adopted it. There are over fifty hospitals and nearly as many dispensaries; and the journals devoted to homocopathy exceed a score in number. It is taught in thirteen medical colleges and in three of the universities. In Europe there is only one university where there is a chair of Homeo-

nathy-viz. at Budapest.

Though Hahnemann is denounced by many as a 'fanatie' and a 'knave,' and notwithstanding that homosopathy has very generally been set aside as a 'frand,' no one can study the history of medicine a trand, no one can starty without perceiving the unring the 19th century without perceiving the powerful influence it has had on the general practice of the medical profession. While, during the first fifty years of the century, homeopathy was gradually becoming more frequently practised, the weapons commonly used against disease were of the most fornddable character. Bleeding by lancet, leeches, and eupping-glasses, mercurialism, purgatives, &c. were in constant use. The progress of homeopathy in Austria, and the assumption on the part of some physicians that it was a purely negative mode of treatment, the success of which was due to the omission of all drugs, led to that scopticism in medicine which, originating with sceptions in medicine which, originating with Skoda in Vienna, prevailed throughout the profession during the next twenty years. 'Placebos' took the place of the lancet, bread-pills formed a substitute for purgatives, and 'ptistus' did duty for mercury. As the literature of homeopathy increased a revival of interest in the use of drugs followed; and during the last twenty years the method of studying the actions of drugs originally suggested and carried out by Hahnemann has been adopted to a very large extent, under the designation of pharmaeology; while, for practical purposes, the uses of drugs proposed by homocopathists, and set forth in their journals and published works, have, as has already been stated, been very largely followed. See the article MEDICINE.

The chief authorities on homocopathy are: The History The chief authorities on homeopathy are: The History of Homeopathy: its Origin and Conflicts, by Dr Ameke, translated by Dr A. E. Prysdale; Lectures on Homeopathy, by Dr Dudgeon; Homeopathy: its Principle, Method, and Future, by Dr Popo; Fifty Reasons for being a Homeopath, by Dr Burnett; A Manual of Therapeutics, by Dr Hughes; A Manual of Pharmacodynamics, by Dr Hughes. The Homeopathic Review and The Hemeopathic World are unblished beautify. The Homeopathic World are published monthly.

Monology. See Analogy, and Darwinian Theory, Vol. III. p. 689.

Montoousian (Gr. homos, 'the same,' and ousie, 'substance') and Homorousian (Gr. homoios, 'like,' and ousie, 'substance'), two terms that long distracted the primitive church in connection with the Arian and semi-Arian controversion. San Arian Company troversies. See ARIUS, CREEDS.

Homep'tera (Gr. homes, 'the same, uniform;' heren, 'a wing'), a division of the insect order Hemiptera (q.v.), including Coccus insects, Aphides, (c. d. v.).

Momotaxis. See Contemporanerry.

Homs. See HEMS.

Honan, one of the central provinces of China, desolated in 1887 by the innudation of the Houngho. See China, Hoang-ho.

Monawar, a small scaport on the Malabar or west coast of India, is a town in the district of North Kanara, in the presidency of Bombay, and is 340 miles SSE, of Bombay, Pop. 6658,

Honduras, the third largest republic of Central America, extends from 13' 10' to 16° 1' N. lat. and from 83° 11' to 89° 25' W. long. It lies between Nicaragna and San Salvador and Gunte-mala, and is bounded on the N. and NE by the Bay of Honduras and the Caribbean Sea, having here a coast-line of some 400 miles; while on the S. the Bay of Fonscea, over 50 miles long and about 30 wide, opens to the Pacific. The area of Florduras is calculated at 46,500 sq. m.; the popis returned at (1887) 331,917. Except for a narrow strip of swamp-land along either coast, the country is a tableland, its series of elevated plateaus broken by broad and fertile plains and valleys, or

rising to mountain-ridges that reach 8000 feet (highest peak, the Montaña de Selaque, 10,120 feet). There are no active volcanoes. The Cordiileras proper traverse the country irregularly in a north-west and south-east direction. Honduras is watered by immumerable streams, though these are seldom navigable, and then only for short distances; the Wanks or Segovia, which forms for many miles the boundary with Nieuragna, has a length of 350 miles. Roatan and the other fertile Bay Islands (q.v.), off the north coast, belong to Honduras, as well as two small islands in the Bay of Fonseca. The climate is hot on the coast, where also fever prevails; but in the highlands the temperature is low, and in the principal towns the mean is 74° F. In the mountains heavy frosts enerust the leaves of the pine and oak forests in November and Decembut snow has never been known. Generally speaking, the rainy season extends from May to November. The flora and fanna are very nearly the same as those of Guatemala (q.v.); but in Handuras the raising of cattle is an important industry, while agriculture receives no such attention as in Gnatemala. In minerals Honduras is the richest of the Central American republics. Silver ores in almost every variety are almodant; gold is washed principally in Olancho, and mined in one or two places; rich iron ores are found, mostly magnetic; also copper, antimony, platinum, zinc, and tin. There are bods of lignite in Gracius department, and famous opals that are second only to those of Hungary. The unieral resources have never been properly developed, but now that several North American and other foreign companies are at work, and especially since a wagon-road has been constructed from the Pacific coast to Yuscaran (122 miles), by which heavy machinery can be conveyed into the heart of the silver helt, there is every prospect of scientific methods being successfully applied. The exports in 1887-88, mostly to the United States, and consisting chiefly of cattle, fruits and cocoa-mits, india-rubber, sarsaparilla, timber, and indige, exceeded 3,350,000 dollars. The imports may be estimated at about half that value.

The republic is divided into thirteen depart-Under the revised constitution of 1880, ments. the president is elected for four years, and is assisted by six ministers; and the legislative power is vested in a congress of thirty-seven deputies. The president, bowever, is for all practical purposes a dictator. The active army consists of 500 men, the militia of 3000. The finances of the country are extremely embarrassed, partly owing to wars with the two neighbouring states in 1872-76; while three loans contracted on heavy terms in London and Paris in 1867-70, for the purpose of making an interoceanic railway, have left Honduras saddled with a foreign debt of £5,398,570, exclusive of the interest, which has been accumulating since 1872; and for this there is only a line from Puerto Cortez to San Pedro Sula (38 miles) to show. The internal debt is returned at 1,499,621 dollars. The revenue for the biomial period 1886-88 was estimated at 2,818,265 dollars, the expenditure at 2,826,532 dollars.

Honduras was discovered by Columbus on his fourth voyage, in 1502, and derives its name from the Spanish hondurus, 'depths,' in allusion, according to the common account, to the difficulty he experienced in finding anchorage on its coast. There are numerous pyramids and other remains of the ancient inhabitants. Hondaras threw off the yoke of Spain, with the rest of Central America, in 1821, and became independent on the dissolution of the confederation in 1839. Revolutions and frequent wars with Gnatemala and San Salvador ended only in 1876, since when a considerable improvement is visible. Education is nominally compulsory, and there are primitive state-schools in the towns and large villages, besides a college in Tegneigalpa and Comayagna. The whites are very few in number, the Indians, negroes, and mixel races including all but some 6000 or 7000 of the population. On the Mosquito coast there is a considerable population of so-called 'Caribs' (q. v.). There are no towns of any importance, the largest being the capital, Tegneigalpa, with 12,000 inhabitants. The ports are Amapala, on the Bay of Fonseca, Puerto Cortez or Puerto Caballos, Omoa, and Truxillo. There were thirty-three post-offices in 1885 and 1350 miles of telegraphs, both maintained at a considerable loss; and, hesides a continuation of the interoceanic railway, a line is projected between Puerto Cortez and Truxillo, through a rich fruit district.

See Stephens, Incidents of Travet in Central America (New York, 1841); Squier, Notes on Central America (New York, 1855), and Honduras (Lond, 1870); Wells, Explorations and Adventures in Honduras (New York, 1857); 'Soltera,' A Lady's Ride across Spanish Honduras (Lond, 1884); and Lombard, The New Honduras (New York, 1887).

Honduras, British. See Belize.

Hone, WILLIAM, a versatile and industrions English writer, was born at Bath, June 3, 1780. He had but little education, and, after some years of hopeless drudgery in London as a lawyer's elerk, at twenty started a book and print short there. But his busy mind was too full of all kinds of extraneous projects for success in business; and after no long time savings bank schemes and lunatic asylum inquiries brought him to bankruptey. He struggled bravely to get bread for his already numerous hravely to get bread for his already numerous family by writing to various papers, started the Traveller, and next the Reformist's Register (February 1—October 25, 1817), which quickly earried his name across England by its brilliant political squibs' and paradies, and by the caricatures of Cruiksbank. On the 18th, 19th, and 20th December 1817 be was subjected to three separate trials before special inches for publishing things calbefore special juries for publishing things cal-culated to injure public morals and bring the Prayer-book into contempt. The prosecution was of course really political rather than religious, and the strongest pressure was brought to hear upon the eomt, yet Hone was acquitted on all three counts, after defending himself, weak in health as he was, with remarkable vigour and ability for over six hours each day. Among the more successful of his later satires, all illustrated by Cruikshank, were The Political House that Jack built, The Queen's Matrimonial Ladder (for Queen Caroline), The Mon in the Moon, and The Political Showman. Works that revealed much reading in observe channels were the Apocryphal New Testament (1820) and Amaient Mysteries Explained (1823). The Every-day Book (1826), Table-book (1827-28), and Year-book (1829) contained rich stores of information on manners and antiquities, into which most court, yet Hone was acquitted on all three counts, tion on manners and antiquities, into which most later miscellaneous writers upon folklore and popular traditions have hurrowed. Yet their stout-hearted compiler at the end found himself in a debtor's jail, from which his friends extriented him to start him in a collecthouse—also a failure. In 1830 Hone edited Strutt's Sports and Pastines, and contributed later to the Penny Magazine and the Patriot. In his last years he swing back to the devoit theology of his mother's hearth, and often preached on Sundays. He died at Tottenham, 8th November 1842.

Hones. See Whetstones.

Honesty (Lunaria), a genus of plants of the natural order Crueiferre, of which two species, natives of the south of Europe, L. annua or

bicanis and L. redicira, have long been cultivated in British flower-gardens, on account partly of the heanty of their flowers, and partly of the emious appearance of their large flat seed-pouches (silicules), or rather their large oval membranous dissepiments, which are very persistent, resemble polished films of mother-of-pearl, and are frequently used as mantelpiece and table ornaments.



Honesty (Lunaria bicanis) in seed.

The origin of the English name is doubtful. Some of the older English poets mention the plant as Lunarie—'in soreeries excelling;' for it was reckoned among berbs potent for magic.

Honcy is a sweet, thick liquid produced by bees and other insects of the same genus. The working hees gather the neetar from the nectaries of flowers, and also sweets from other sources when nectar is scarce, which they carry home to the hive in the crop or honey-bag. Here it appears to undergo a transformation, by which it becomes honey before it is disgorged into the cells of the comb. Yet the change is such that many of the distinctive characteristics of the various materials can be traced in the manufactured honey. Thus we find clover and heather honey easily distinguishable, the clover-honey being a clear white—almost greenish-white—fluid liquid; while that obtained from the heather has a rich amber colour, and is much more viscid, so that it cannot be slung from the combs without destroying them. The flavour and colour of other flowers can also be distinctly traced in various honeys, such as that made from the flowers of the ivy and that from honey-dew, the produce of the Aphides, which may be seen in summer in the form of a sticky liquid on the leaves of the lime and other trees. In default of better food bees sometimes resort to this honey-dew. But it imparts a blackish hue to the honey and a disagreeable flavour.

Honey contains dextro-glucose and lavo-glucose, cane-sugar, as also gummy, waxy, colouring matter, and essential odorous oils, along with water and a minute quantity of mineral matter and pollen. The proportion of crystallisable sugar increases with the age of the honey, so that in time it acquires a granular consistency. Exposure to light and cold increases this tendency, which is stronger

in some kinds of pure honey than in others.

As an article of commerce and for human consumption honey is presented both in the comb and as run honey. The run honey is separated from the wax of which the storing cells are composed,

by the centrifugal extractor, or by the more tedious and less perfect method of cutting the comb in pieces and running the honey through a bag placed near a fire. The best form of comb-honey is that which is termed virgin honey. It is contained in pure white cells of very thin wax. These cells have never been used by the bees for any other purpose than the storage of honey. When the cells have been previously used for the incubation of eggs and the development of bees through the larva stage they become discoloured and much thicker in the walls, and after repeated use in breeding they become quite black. Comb-honey in dark-coloured cells is of very inferior quality.

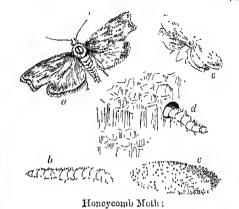
From the remotest times honey has been employed as an article of food. And to the ancients, who were unacquainted with sagar, it was of more importance than it now is. 'A land flowing with milk and hone,' affered the highest conceivable advantages to the eastern mind. The honey of Hyutettus, a mountain in Attiea, and of Hybla, a mountain in Sicily, were of old held in high repute, doubtless in consequence of the wild thyme and other fragrant herbs growing upon them. The honeys of Narbonne and of Chamonix for similar reasons are now held in high estimation, as also the heather-honey of Scotland. Taken in moderate quantity, honey is nutritive and mildly laxative. Some few kinds possess poisonous properties, such as that of the Brazilian wasp and the honey of Trebizond gathered from the Araba pontica. Aluch adulterated honey is sold: see Adultrearties.

As a demulcent and flavouring agent honey is used in many preparations of medicine. It is also used in the preparation of several popular sweetments and in the manufacture of some kinds of ale. Mead is a fermented liquor unde from the washings of the combs from which honey has been extracted. Large quantities of honey are annually imported into Great Britain from America, especially from California, where many large bee-farms exist. See BEE; and for the Honey Ant, see ANT.

Honey-buzzard, or Bee-kite (Parnis apizorus), one of the Falconida, allied to both kites
and buzzards, but with many peculiarities, such as
the thick feathering of the sides of the head down
to the base of the bill. It winters in Africa, and
breeds in the wooded districts of north Enrope,
ranging, however, as far east as China and Japan.
To Britain it is usually only a visitor, and that not
very cammonly; but there are records of its occasional breeding here. Howard Sannders tells how
collectors of 'British' specimens paid £5 for a
couple of eggs, or £40 for a pair of ald birds, till
the breeding virtually ceased. The honey-buzzard
owes its name to its habit of plundering the nests
of bees and wasps for the sake of the larva, and
apparently also the honey. It also devours grubs
of many kinds and various small animals. The
nest, often founded on that of some other kite, is
situated on some leafy tree, and may be further
concealed by a covering of leaves, which are replaced as they wither. The eggs, usually two, are
laid in June, which is late for a bird of prey. The
genus includes a few other species.

Roneycomb Moth, or Bev-Moth (Galleria), a genus of small moths in the same family as the Grass-moths (Crambus), and noteworthy for the liabit some of the species have of infesting heelives. There they deposit their eggs; and the larva feed on the honeycomb, through which they make tunnels lined with silk. In a corner of the live the cocoons are span, and the metamorphoses accomplished. There are two broods in the year, and the later pupe sleep through the winter. The best-known species, G. mellonetta, is a satiny math, about an inch across the wings. When they occur

in numbers they are very injurious or even quite fatal to the live. They appear to enjoy immunity from the stings. A smaller species (G. alvearia) is



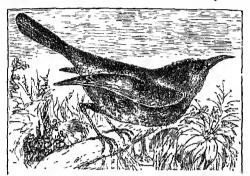
 a, Galleria mellonella; b, larva, c, pupa; d, larva working its way (fitough honeycomb; c, Galleria alveatia.

also distinguished by some authorities. Humblebee nests are infested as well as bee-hives.

Honey-dew, a viscid succharine exudation which is often found in warm dry weather on the leaves and stems of plants, occurring on both trees and herbaceous plants. It is often, but not always, associated with the presence of Aphides, Cacei, and other insects which feed on the juices of plants, and its flow is ascribed to their punctures; but the rupture of the tissues from any other cause. such as the state of the weather, seems also to produce it, and warm dry weather seems to be necessary for the production in the sap of that superaloundance of sugar which is thus thrown off. Aphides themselves exude by certain peculiar organs (see Aphis) drops of a fluid which is called honey-dew, which probably differs considerably from the direct exudation of the plants on which they feed, but mingles with it where they abound. Honey-dew is often so abundant as to fall in drops from one leaf to another on to the ground, some-times falling from trees even as a copious shower. Different kinds of manua are the dried honey-dew or sacchurine exhibition of certain plants. See MANNA. But very generally this exhibition, as it dries, conts the surface of leaves and branches with a channy film, to which everything brought by the atmosphere adheres, and on which moulds and other small fungi soon grow, and thus the pores of the plant are elogged and its health is impaired. deadeners me therefore eareful to wash off honey-dew with the syringe. Orange and lemon plantations sometimes suffer great injury from the abundance of houey-dow; and it has proved a cause of very great loss in the coffee-plantations of Ceylon.

Honey-eater, or Honey-sucker, the name of a large family of birds (Meliphagidae), tribe Tennirostres, order Insessores, characterised by their long, sharp, slender, curved bills, and their long eleft extensile tongue terminating in a pencil of bristle-like filaments. They are entirely confined to Australia and the islands included in the Australian region, where they are very abundant, living on honey and insects, which they are particularly well adapted for gathering from the flowers of such trees as the Encalyptus and Bauksia. Twenty-three genera and 190 species are enumerated. Several of the genera are confined to Australia, others to New Zealand, and a few range over the whole Australian region. In India and Africa they are replaced by the Sun-birds (Nectariniidae). They are birds of active habits and generally very beautiful

plumage. One species, called by the Australians the Rifleman or Rifle-bird (Meliphaga or Ptiloris puradiscus), is said to be the most gorgeously-plumaged of all known birds; the female is more sombre in dress. Another species (Myzantha melanophrys) is called the Bell-bird, because its voice resembles the tinkling of distant sheep-bells.



New Holland Honey-cater (Meliphaga Norw Hollandiae).

To this family is referred the Parson-bird or Thi (Prosthemodera Novæ Zcelandiæ), a bird larger than a blackbird, and of a blaish or greenish-black colour, with white streaks on the back of the neck, a white spot on each wing, and two tufts of snow-white downy early feathers ornamenting the sides of the throat. Unlike most of the Meliphagidhe it is a bird of fine song. It has also great powers as a mocking-bird, readily learns to speak many words, and becomes very familiar in domestication.

Honey-guide, Indicator, or Moroc, a genus of birds (Indicator) formerly classed as enckoos, and to an extent partaking of their habits, but now ranked as a small separate family (Indicatorida), perhaps most nearly allied to the woodpeckers and barbets. Of cleven species known eight are peculiar to Africa. They are all hirds of similar coloration, being generally of a dull gray tinged with yellow or olive; they vary considerably in size, the larger species measuring about 8 inches in length, the smaller not exceeding four inches. They have acquired their name from their habit of guiding men to honey, a curious instinct prompting them to hop from tree to tree before the traveller whose notice they have succeeded in attracting by finttering and uttering a peculiar cry, and to lead to a place where a bees' nest may be found. The cry is said to change in character on reaching the locality of the nest.

Honey Locust Tree (Cleditschia triacanthos)
—also known as the Sweet Locust and Black
Locust, and in Britain as the Therethorned
Acacia—a lofty and beautiful tree of the natural
order Leguminosa, sub-order Casalpinica, a native
of the valleys of the Alleghanies and of the basin
of the Mississippi. It is not found wild on the
Atlantic coast of North America, although often
planted for ornament in the vicinity of habitations.
The flowers—which are small, greenish, and in
spikes—have, when perfect, six stamens and one
pistil, but are very generally unisexual. The leaves
are twice pinnate, without terminal leaflets, the
numerous small leaflets giving a peculiar gracefulness to the foliage, which is of a light shining green.
The tree is furnished with numerons sharp triple
spines. The pods are long, flat, pendulous, often
twisted; the seeds large, brown, and enveloped
in a pulp, which, when the pod is ripe, is very
sweet. Sugar has been made from it, and when
fermented it yields an intoxicating beverage in
use among the American Indians. The honey

locust attains a height of 70 or 80 feet. Trees of large size are to be seen in some parts of Britain. The wood resembles that of the Locust Tree (q.v.), or False Acacia (Robinia pseudacacia), but is more coarse-grained.

Honey-stone, or Mellite, a mineral of remarkable characters and composition, found in connection with brown coal (generally accompanied by sulphur) in several places in Germany. It occurs in square octahedrons, looks like a honey-yellow resin, and may be cut with a knife. It is a mellate of alumina, consisting of mellitic acid, alumina, and water.

Honeysnekle (Loniciva, or, according to some botanists, Caprifolium, which others make a subgems of Lonicēra), a genus of plants of the natural order Caprifoliacea. They are shrubs, often twining, and have the flowers two or more together in axillary heads. The calyx is short and 5-toothed; the corolla tubular-finned shaped, 5-eleft, generally two-lipped; the fruit a 2- or 3-celled berry, containing one or very few seeds. The Common Honeysnekle, or Woodbine (L. Privilymentum), is very abundant in woods and thickets in most parts of Britain. On account of its beautiful cleam-coloured whorls of flowers, and their delicious fragrance, it is often planted in shubberies and trained against walls. It is said to be the 'twisted eglantine' of Milton. The phenomena observed in its growth have been adduced in proof of a perceptive power in plants; the branches shooting out till they become unable to bear their own weight; and then, on their meeting with any other branch, twining around it, from right to left; but if they meet only with one another, twining in different directions, one to the right, and another to the left.—



Perfoliate Honeysnekle (Lonicera caprifolium).

a, flower; b, truit.

(L. caprifolium), with paler whorls of flowers, and remarkable for having the upper leaves united so that an opposite pair form one leaf, through the middle of which the stem passes. This peculiarity is confined to the flower-bearing shoots, and does not occur on the young runners; it is also most perfect nearest the flower. This species is a native of the south of Europe, but is now naturalised in many parts of Britain, and much planted, as, although less powerfully fragrant than the Common Honeysuckle, it flowers earlier.—There are numerous other species, natives of Europe, Siberia, and North America. The Fly Honeysuckle (L. Xylosteum) is an erect shrub, a native of Europe and Asia, scarcely indigenous in Britain, but common in shrubberies. Its branches are not unfrequently used in some parts of Europe for tubes of tobaccopipes; and it is said to make good hedges in dry

soils. Other erect species are not unfrequently planted in shrubberies.—The Trumpet Houeysuckle (L. semperations), called in America the Caral Honeysuckle, is a native of the southern states of North America, often planted in Britain on account of its beautiful flowers, red on the outside, and scarlet within, which, however, have no fragrance. It is a twining evergreen shrub.—The berries of the honeysuckles are museous.—The berries of the honeysuckles are museous.—The name honeysuckle is also given to shrubs very different from this genus, but of which the flowers abound in honey, as to species of Banksia in Australia, Aladea miscosa is called Swamp Honeysuckle in North America. See also Feench Honeysuckles.

Horsten, a scapart in the French department of Calvados, is situated on the southern side of the Seine estuary, opposite to Havre, from which it is 7 miles distant. It is irregularly huilt, dirty, and minteresting. There is a school of bydrography, and one of its churches is a celebrated place of pilgrimage to sailars. The commerce of Hondlear, once of much greater importance than at the present time, has been absorbed in great measure by Havre. But the harbour and its approaches were greatly improved in 1874-81, and there is still a considerable export of eggs, butter, poultry, corn, and cattle, mostly to England, and import of inon and coal, and of timber from Norway. The principal manufactures are leather, castmetal, and refined sugar. There are also repewalks and shiphuilding yards. Pop. 9265.

Hong-kong, or Hiang-kiang ('sweet waters'), an island of southern China belonging to Great Britain, situated on the east side of the river Canton, and about 90 miles S. by E. from the city of Canton. It consists principally of a rugged ridge of grantic rocks, extending from northwest to south-east, and has an area of 20 sq. m. Barren and desolate, with scarce any traces of cultivation, the island itself presents a striking contrast with the heanty of its harbour, a magnificent sheet of water, 10 sq. m. in extent, one of the finest in the world, which stretches between the northern shore of Hong-kong and the peninsula of Kowlaon an the opposite mainland. The straits that separate the two are scarcely half a mile wide on the east, but expand greatly towards the west.



It is to the excellence of its harbour, to the fact that it has been made a free port, and to its being the headquarters of European linance in castern Asia, that Hong-kong owes its importance as the principal commercial entrepôt of southern China, if not of eastern Asia. The annual value of the merchandise brought into Hong-kong

ports exceeds £10,000,000, and the value of that carried thence is more than £22,000,000. The trade between Hang-kong and Great Britain amounts to a value of 3 million pounds sterling for exports from Hong-kong, and more than 11 million for imports into Hong-kong. The principal objects of commerce are opinm (imported) and tea and silk (both exported); the Chinese trade in these last two commodities is almost exclusively in the hands of Hong-kong merchants. Other articles of trade are sngar, flour, rice, salt, hemp, copper, lead, iron, wouldens, earthenware, nut-oil, amber, cutton, sandalwood, ivory, hetel, vegetables, live-stock, granite, and shipping stores. The last named, together with sngar, rnm, ice, and ropes, are the chief manufactures on the island. Hong kong is in regular steam communication with Europe, India, Singapore, Australia, Japan, Canada (Vanconver), and San Francisco. Every year several thousand Chinese coolies pass through the port going abroad and returning home. In the five years ending 1887 the emigrants averaged 62,000 seminally, and in that year rose to 83,000; in 1887 the immigrants were more than 92,300 in number. The mean annual temperature is 75° F. The summer is hot and generally rainy; since 1884 the temperature has been steadily rising on the whole. But the island is not unhealthy, except at cortain seasons. Thunderstorms are frequent, and typhoons occasionally work great havoc and cause serious loss. An observatory is maintained on the island. From 5000 in 1841 the inhabitants increased to 37,058 in 1851, and to 123,511 in 1861, to 123,898 in 1871, to 160,402 in 1881, and 212,951 in 1888, of whom only 60,524 were females. Within the ten years preceding the last-quoted date the cost of living increased 20 per cent. Hong-kong is the seat of a British governor and is a British naval station (see COALING STATIONS). The city of Victoria, the capital of the island, stretches some 4 miles along the northern shore, and from its situation frequent, and typhoons occasionally work great along the northern shore, and from its situation on the slopes and terraces of the hills overlooking the harbour and its bandsome streets and houses, is justly entitled to be called one of the finest eities in the East. Here dwell all the Europeans and most of the Chinese portion of the population. On the mainland the extremity of the peninsula of Kowloon, embracing an area of 2% sq. m., was ceded to Great Britain in 1861, and now forms administratively part of the dependency of Hong-kong. The island was first occupied by Great Britain in 1841, and was scenred to her in the following year by the treaty of Nanking.

Moniton, a market town and municipal borough (1846) of Devonshire, near the left bank of the Otter, 17 miles by rail ENE. of Exeter. Four times devastated by fire between 1747 and 1797, it is a modorn well-built place; but its old parish church, on a bill, contains a fine oak screen, creeted in 1482 by Bishap Courtenay of Exeter. The famous Honiton pillow-lace, a manufacture introduced here by Flemish refugees in the middle of the 16th century, is still a specialty of the district (see LACE). The beautiful vale of Honiton is famous for its lutter. Honiton was disfranchised in 1868. Pap. (1851) 3427; (1881) 3358.

Honolulu, the capital of the Hawaiian or Sandwich Islands, is situated on the southern coast of the island of Oalm. It is at once the seat of government and the commercial centre of the Hawaiian kingdom; but it was not originally the capital, and its importance is of modern growth, being due to the fact that its harbour is the only really well-protected port in the Archipelago, The harbour, which has attracted to Honolulu first whaling vessels and subsequently traders of all

kinds, is not a large one. It is entered through an opening in the caral-reef, is 150 yards wide at the entrance, and extends for rather more than a mile in a north and south direction. The town stands close to the shore, on a narrow plain at the month of the Nunanu valley, which runs back between cliffs into the main range of Eastern Monntains. The strip of flat land on which the town is built is naturally bare and dry, and the mountains, which protect the harbour from the north-easterly tradewinds, also keep off the rain, so that the rainfall at Honolulu is much smaller than in some other parts of the islands. Water-works, however, supply migation, which keeps the gardens of the town bright with flowers and foliage. The centre of the town is well laid out in rectangular streets, with honses built in European style; most of the appliances of civilisation are to be found, notably telephones; there are fine government buildings, and an interesting public library. The climate is pleasant, the least healthy time being when sontherly or south-we-terly breezes blow; foodsupplies are plentiful; and ships running between America and Asia or Australasia constantly call at the port. The population is estimated at over 20,000, including a large number of foreign hands, and the town is described as 'having a thoroughly American aspect.' See also HAWAH.

Honorarium. See FEES.

Honorius, Flavius, second son of the Roman emperor. Theodosius the Great, was born in 384. On the death of his father the empire was divided between him and his brother Arcadius, Honorius receiving the western half, with Rome as his capital. Being only ten years old, he was put mider the guardianship of Stilicho (q.v.), who was the de facto ruler of the western empire until 408. After the death of Stilicho, who had been the strong hulwark of western Rome against the barbarian invasions, Alarie the Goth overran Italy, and hesicged Rome, and took it in 410. A new champion of the empire arose in Constantius, who was appointed the colleague of Honorius in the consulship, and received in marriage (417) the hand of his sister Placidia, along with a share in the empire. But he did not long enjoy his good fortune, as his death took place a few months after. Thereafter things went from had to worse in the empire, and the weak Honorius lost his hold of the fair provinces beyond the Alps, whilst Africa was a secting caldron of revolt and civil way. The first emperor of the West died in 423, at Ravenna, which he had made his capital in 403. See J. B. Bury's History of the Luter Roman Empire (1890).

Honorins I., who succeeded Boniface V. as Bishop of Rome in 625, was born of a consular family in Campania. His name is connected with the history of the paschal controversy in Ireland and with that of the early Anglo-Saxon Church. During his pontificate the hishopric of York was elevated to the rank of an archbishopric, and the festival of the Elevation of the Cross was instituted. At the height of the Monothelite (q.v.) controversy Honorius, at the suggestion of Sergius, patriarch of Constantinople, abstained from condemning the new doctrines, and for his lukewarmness in so doing was stignatised as a heretic at the Conneil of Constantinople (680). He died in 638, and was succeeded by Severinus. Some letters of his are preserved in Labbe's Collectio Conciliorum, vol. iii.

Honour, Maids of. See Household.

Honourable, a title given in the United Kingdom to the younger sons of Earls, and all the children of Viscounts and Barons; to Maids of

Honour, Lords of Session, the Supreme Judges of England and Ireland. For the persons entitled to be styled 'Honourable,' 'Most Honourable,' and 'Right Honourable' respectively, see Address (Forms of). In America custom attaches the title of Honourable to the names of governors of states, judges, members of congress, and other public functionaries.

Honours, MILITARY. See SALUTES; and for Honours of War, see CAPITULATION.

Houtheim, Johann Nikolaus von, was born at Treves, 27th January 1701. He was educated in the Jesuit school of his native city, studied canon law at Lonvain, and afterwards tanght it for ten years at Treves, of which see he became suffragan bishop in 1748. He is the anthor of two works on the history of Treves, Historia Trevirensis Diplomatica (3 vols. 1750) and Prodromus Historia Trevirensis (2 vols. 1757). But he is chiefly memorable for a theological essay in Latin, On the State of the Church and on the Legitimate Authority of the Roman Pontiff (1763). This he published under the nom de plume of Justinus Febronianism (q.v.). His scheme may be described as an exaggerated form of Gallicanism, with the democratic element of congregationalism superadded. The work was condemned by Clement XIII. immediately after its appearance. When it became known in 1778 that Hontheim was the author, Pins VI. required from him a retraction of his doctrines. But three years later in his Communicarius Hontheim repeated his old views. He died at Montquintin in Luxembourg, September 2, 1790.

Honthorst, Gerard van, Dutch painter, horn at Utrecht on 4th November 1590, and died there on 27th April 1656. He was a member of the painters' guild of Utrecht (1622-37) and of that of The Hagne (1637-52). He twice visited England (1620 and 1628), and painted portraits of the royal family and an allegory (now at Hampton Court). He also found patrons in Elizabeth of Bohemia and the princes of Orange. His best pictures are imitations of Caravaggio, whose works greatly influenced him whilst studying in Rome; he was particularly fond of painting interiors dimly illumined by lamps or candles. The 'Liberation of St Peter,' the 'Martyrdom of St John,' the 'Minsician,' the 'House in the Wood,' and the portraits of Mary de' Medici, the king and queen of Bohemia, and the Duke of Buckingham may be taken as representative of his skill.—His brother William (1604-66), an historical and portrait painter, worked for the court of Berlin from 1650 to 1664.

Honvéd ('Land-defenders'), the name given in Hungary under the earlier kings to the national champions. In the summer of 1848 the term was revived, and applied first to the revolutionary armics, and after the organisation of the Hungarian landwehr in 1868 to that body of men.

Hood. The academic hood is a modification of the monks' cowl; the right to wear hoods is bestowed by universities and by certain chartered colleges, and the value and source of the wearer's degree are indicated by the material, shape, and colour of the hood. A very complete list of university and other degrees and hoods is given in Whitaker's Almanuck.

Hood, Mount. See Cascade Range.

Hood, ALEXANDER, Lord Bridport, admiral, horn in 1727, was the younger son of the vicar of Thorncombe, near Axminster, and younger brother of the more famous Viscount Hood. The date of

766 HOOD

his entry into the service and the events of his early career are unknown. Both the Hoods entered the service under the patronage of Admiral Smith, componly called 'Tom of Ten Thousand,' a noted character in his day. On the 2d December 1746 Alexander Hood received his commission as lientenant, and on the 10th June 1756 attained post rank and the command of the *Prince George* In 1757, being in command of the Antelope (50 guns), he drove on shore in Andierne Bay the French frigate Agnilon of 48 guns. After service in the Mediterranean and Channel under Saunders and Hawke, be again distinguished himself in 1760, while in command of the Minerra frigate (32 gnns), by recupturing from the French the Warwick, a 60-gnn ship, formerly English, but now armed with 34 gnns. During the war of American independence he served much under now armed with 34 gnns. Keppel, Rodney, and Howe in the Chaunel and the Strait of Gibraltar. In the notorious Keppel court-martial he appeared not wholly to his credit. During the French revolutionary war he served in the Channel with distinction, having a share in the famous victory of the 1st June, and afterwards in command of blockading squadrans. He attained th command of mockading squarture. The attributed flag rank in 1780, and was raised to the peerage as Buron Bridport of Cricket St Thomas, Somerset, in 1796, and Viscount Bridport in 1800. He died 3d May 1814. See *Navad Chroniele*, vol. i. pp. 265–283, and the Rev. T. Keppel's *Life of Lord Kanad*. Keppel.

Hood, John Bill, an American general, was born at Owingsville, Kentucky, 1st June 1831, gradnated at West Point in 1853, and saw some service against the Indians. Ho entered the Confederate army, commanded a brigade, and was severely woneded at Gaines's Mill, at Gettyshurg, and at Chiekumanga, where he lost a leg and was made lientement-general. He commanded a corps under General J. E. Johnston in the retreat to Atlanta, and in July 1864 succeeded him in command of the army. On September 1 he was compelled to evacuate the city, and leave the road free for Sherman's march to the sea. He yet made a bold attempt to cut Sherman's communications, and, though worsted at Franklin on November 30, pushed as far north as Nashville; but here he was again defeated by Thomas on December 16, and at his own request he was relieved of command. He died in New Orleans, 30th August 1879. His personal experiences were published posthumously as Advence and Retreat (1880).

Hood, Robin. See Robin Hoon.

Hood, Samuel, Viscount Hood of Whitley, admiral, elder brother of Lard Bridport, was born at Thorncombe in 1724, and entered the may in 1740 under Commodore Smith on board the Romney. He was promoted lieutenant in 1746, commander in 1754 after seeing good service, and post-cuptain in 1756. While in that rank he commanded the Vestal frigate of 32 gams, in which be took a French frigate of equal force after a ticreely-contested action. After much other service at sea he was made commissioner of Portsmouth dockyard in 1778. In 1780 he was promoted to flag rank, and sailed almost ut once in command of a squadron to reinforce the North American and West Indian stations under the orders of Rodney. He remained in these waters till peace was signed; and, as they were the great scene of the naval war, he had many apportunities of distinguishing himself. In April 1781 he faught an action with De Grasse off the Diamond Rock, and in July of the same year—Rodney having gone on leave—was engaged under Admiral Graves in the battle off the Chesapeake. In January 1782 he was back in the West Indies, and showed

himself a tactician of the most brilliant kind by the masterly series of manonvers by which be outwitted De Grasse in the actions fought in the Basseterre Roads off the island of St Kitts. When Rodney arrived to take command with the re-inforcements from England, Hood became again his second in command. In that rank he had a conspicuous share in the winning of the decisive victory of the 12th April, commonly called the battle of Dominica. The brunt of the preliminary action of the 9th fell on his division, and on the 12th he led the rear of the English line. For his services on this occasion be was made Baron Hood of Catherington in the Irish peerage. In 1784 he stood against Fox for Westminster, and was He became a Lord of the Admiralty in elected. 1788. When the great revolutionary war broke out in 1793, he was appointed to the Mediter-In that position he directed the occuparanean. In that position he directed the occupa-tion of Toulon and the subsequent operations in the Gulf of Lyons and on the coast of Corsica, He hanled down his flag in 1795. In 1796 he was made Viscount flood in the peerage of Great Britain, and he died at Bath, 27th June 1816. Lord Hood had the reputation of being a con-summate tactician. Nelson, who seved under him, considered him the ablest of our admirals in the early years of the war, and it is said that a plan he drew up for an attack on a French fleet at anchor, which was prevented by foul winds, had some share in inspiring the plan of attack adopted in the battle of the Nile. See Naval Chronicle, vol. ii. pp. 1-46; Mondy's Rodney; Nelson's Letters and Desputches; James's Naval History.

Hood, Thomas, poet and homorist, was born on the 23d of May 1799, at No. 31 the Poultry, in the City of London, where his father carried on the business of a publisher in partnership with a Mr Vernor. Thomas Hood the elder was a native of Scothand, the son of parents in humble circumstances, near Errol, on the north bank of the Tay, between Porth and Dondee. Originally bound apprentice to a bookseller in Dundee, he had proceeded to London, and finally became member of the firm just mentioned. He was himself a man of some turn for authorship, and even wrote a couple of novels now forgotten, so that his more distinguished son was born, as he expressed it, 'with ink in his blood.' The elder Hood married the sister of Mr Sands, an engraver of some repute, from whom Thomas Hood probably received his first impulse towards art and artistic associations. To Thomas Hood, the publisher, and his wife, were born a family of six children, two sons and foundinghters, of whom Thomas was the second son. There was a tendency to consumption on the mother's side, for the malady was futal to the elder son James and to two of the daughters, and in the sequel to Mrs Hood, and was at the root of those complicated disorders which made the life of Thomas Hood 'one long disease.' The father contracted a chill while amesing his elder son, and died after a few days' illness in 1811, when Thomas was only twelve years old, leaving the widow and remaining children in reduced circumstances.

In his Literary Reminiscences, a discursive antobiography written by Hood in 1839, and published in the first series of Hood's Own, he tells us that he owed his earliest instruction to two maiden ladies, of the name of Hogslesh, who had a small school in Token House Yard; that he was then sent to a suburban boarding-school (the 'Clapham Academy' of his famous Ode), and ultimately to a day-school at Clerkenwell, where his mother went to reside after her husband's death. His education, ordinarily so called, closed at this point; and after the age of thirteen or fourteen his own keen and

HOOD 767

catholic love of reading was the foundation of that singular versatility and resource which marked both his poetic and his humorous vein. For the next two years of his life there is some nucertainty as to his pursuits. According to his own account, he was now placed, through the influence of a friend of the family, in a merchants counting-house in the city, but his health proving unable to stand the confinement to the desk, he was shipped off to Dundee, where relations of his father were living, among whom he resided for some three years, from 1815 to 1818.

These three years were important in Hood's life, The threatened consumption was for a time warded off—the hoy led the healthiest of outdoor lives in fishing and boating—he had ample leisure besides isining and boasing—ne nad ample resure besides both for reading and sketching, and he began to practise his pen both in verse and prose in the pages of local newspapers and magazines. In 1818 he returned to London with his health apparently reestablished, and entered the studio of his uncle, the engraver. After a short apprenticeship of only two years be began to work on his own account, until, the literary instinct beginning to wax far stronger than the graphic, he seems to have discovered where lay the true field for his genins. About the same time the London Magnaire, losing its editor, John Scott, and passing into the hands of Taylor and Hessey, Thomas Hood, then a young man of two-

and twenty, was appointed sub-editor.

Nothing more propitions for Hood's gening could we happened. It emancipated him for ever from have happened. It emancipated him for ever from the engraver's deak, the drudgery and constraint of which were seriously affecting his health, and it threw him at once into a society of writers best litted to call forth all that was best in him. He now found himself in daily companionship with such men as Procter, Cary, Allan Cumingham, De Onincey, Hazlitt, and, above all, with Charles Lamb, with whom a close friendship spring up, destined to be one of the best influences of Hood's literary life. It was, however, the intimacy with John Hamilton Reynolds, whose sister he married three years later, that more than all the rost served to encourage and train Hood's poetic faculty. John Kents had died early in 1821, the year that Hood joined the magazine, and it does not appear that they ever met; but Reynolds had been the close friend and disciple of Keats, and Hood passed at once under the same fascinating influence. Between July 1821 and July 1823, besides other and lighter contributions to the London, Hood wrote and published in the magazine some of the finest and published in the magazine some of the finest of what may be called the poems of his Keatsian period—Lyous the Cantaur, the Two Peacocks of Bedfont, the Ode to Autumn, and others—poems which have never materially increased Hood's fame with the ordinary reader, chiefly because Hood the humorist appeals to a larger andience than Hood the poet, and the world is always in-disposed to allow credit to a writer for gifts of very opposite kinds. And although in the class of subjects, and in the very titles of these poems, as well as in turns of phrase and versification, the influence as in turns of purise and versinearing, are minute of Keats is unmistakable, the poems show quite as markedly the result of an ear and taste formed upon a loving study of the narrative poems of Shakespeare. And over all there hung a tender melancholy observable in all Hood's serious verse, engendered in a personality on which from the beginning there rested the shadow of impending fate. In spite of real and original poetic quality, these poeus, issued anonymously, failed to attract notice, and when in 1827 he produced them with others of still liner quality in book-form, the volume fell all but dead from the press.

A different fate attended an earlier venture in 1825, when Hood and his brother-in-law Reynolds

published (also anonymously) the little volume entitled Odes and Addresses to Great People. While writing serious poetry in the London it had fallen to Hood's lot to act as 'comic man or humorous choins to the magazine, and as such to invent facctions answers to correspondents, real or imaginary. Among these he had inserted a burlesque Ode to Dr Kitchener, exhibiting a verbal wit of quite different flavour from the ordinary. The success of this tritle seems to have suggested a collection of similar odes, to which Reynolds contributed a few. But Hood's was far the more conspicuous share, revealing a wealth of lumnorous ingenuity that at once attracted notice. Coleridge wrote, attributing the book to Lamb, as the only writer he knew capable of the achievement. The book passed rapidly through three editions, and practically determined the chief occupation of Hood for the remainder of his short life. His musical melancholy verse had brought him no recognition. His first facetions efforts had gained him an audience at once. From that day forth the vein thus opened was to be worked, in health and in sickness, with the grain and against the grain, for

twenty years of anxiety and struggle.

For Hood had married in 1824 contrary, it is to be feared, to all counsels of prindence. The marriage was one of truest affection, but it could hardly have been acceptable to Mrs 11000 s manner. Hood had no means of support but his pen, and his have been acceptable to Mrs Hood's family, for health was already matter of serious anxiety. marriage soon produced strained relations with the Reynoldses, and in the end a complete estrange-ment from Hood's early friend and brother in law. The Odes and Addresses were followed in 1826 by the link series of Whims and Odditics, where Hood first exhibited such graphic talent as he possessed (he said of himself that, like Pope's 'tape. tied curtains,' he was 'never meant to draw') in these picture puns of which he seems to have been the inventor. A second series of Whins and Odditics appeared in 1827, dedicated to Sir Walter Scott, followed without delay by two volumes of National Tules, the least characteristic and noticeable of Hood's writings. In 1829 he edited The Gen, one of the many fashionable annuals then in vogne—a remarkable little volume, for besides Charles Lamb's 'Lines on a Child dying as soon as born,' written on the death of Hood's first child, it gave to the world Hood's Engene Aram, the first of his poems showing a tragic force of real individuality.

Hood and his wife, who passed the first years of their married life in Robert Street, Adelphi, left London in 1829 for a cottage at Winchmore Hill, a few miles north of the metropolis, where he schemed the first of those counc annuals which he produced yearly and single-handed from 1830 to 1839. In 1832 he left Winchmore Hill for an old-fashioned house at Wanstead, in Essex, forming part of the old historic mansion, Wanstead House, where the ond instoric mansion, wanstean House, where the romantic seenery of the park and neighbourhood furnished him with a background for his one movel, Tylney Hall, written during the next two years, and imblished in three volumes in 1834—a story of a conventional melodramatic type, with an underplot of cockney life and manners, not without many touches of Hood's peculiar charm, He never repeated lut on the whole a failure.

the experiment of prose romance.
In 1834 the failure of a publisher plunged Hood into serious money difficulties by which he was hampered for the rest of his life. After the birth of his second child, a son, in January 1835, and the dangerous illness of Mrs Hood which followed, the family went abroad and settled for two years at Coblenz on the Rhine, and for the next three years at Ostend. During these five years Hood,

struggling against the slow progress of a fatal disease, continued to produce his Comir Annuals and other lighter matter, and schemed his Up the Rhine, a humorous account of the proceedings of an English family in Germany, told in letters, and too obviously imitated from Humphrey Clinker. This, when published in 1839, at once hit the public taste, but seems to have brought little profit to its author, who, apparently destitute of all business faculty, suffered throughout his career from the misfortunes or the superior sagacity of his publishers. The sufferings of Hood during these five years were very terrible, and are only hinted by his son and daughter in their memoir of their father. In an unpublished letter to his wife in April 1840, written during a temporary visit to England from the house of his generous friend, the first Charles Wentworth Dilke, he writes: 'I find my position a very ernel one—after all my struggles to he, as I am, almost moneyless, and with a very dim prospect of getting any, but by the sheer excreise of my hen. What is to be done in the meantime is a question I ask myself without any answer but—Bruges jail. At the very moment of being free of Bailey, am I tied elsewhere, hand and foot, and by sheer necessity ready to surrender myself that slave, a bookseller's back!'

By the kindness of friends Hood was enabled to return to England, with security from his creditors, in 1840. Disease of lungs and heart was now so far advanced that the fatal issue was only a question of time, but he continued to struggle on heavely and cheerfully for five years longer. In 1841 he was affered by Colburn the editorship of the New Monthly Magazine at a salary of £300 a year, a post which he filled for two years, when, a difference arising with the proprietor, he resigned the editorship, and in January 1844 started a new periodical of his own, Hood's Monthly Magazine, destined to be his last literary venture. Meantime in the Christonas number of Punch (1843) had appeared the 'Sang of the Shirt;' and in Hood's Magazine, during its brief career, there followed the 'Hannted House,' the 'Lay of the Lahamrer,' and the 'Bridge of Sighs,' proving that, as the darkness of his own prospects deepened, the sympathies with his kind deepened also, and quickened his finest genins. Only a few months after the starting of the magazine a notice to the subscribers had to tell that the health of the editor was rapidly failing. Towards the end of the year his friends used their interest with the government of the day, and in November Sir Robert Peel wrote amouncing a pension to Mrs Hood's last contribution, the touching lines, prophetic of his approaching end, beginning:

Farewell life—my senses swim, And the world is growing dim,

and ending:

O'er the earth there comes a bloom, Sunny light for sulten gloom. Warm perfume for vapours cold— I smell the rose above the mould!

After three more months of increasing pain and distress, Thomas Hood died at Devonshire Lodge, Finchley Road, on the 3d of May 1845. He was buried in Kensal Green Cemetery. His devoted wife, broken in health with the long attendance on her husband, survived him only eighteen months.

Hood produced in twenty-four years an amount of prose and verse of which at least one half the world might willingly let die. Of the other half, all the serious poetry is remarkable, and a small portion of first-rate excellence. Lyrics such as the 'Song of the Shirt,' the 'Bridge of Sighs, 'Eugene Aram,' the song beginning 'I remember, I remem-

ber, the house where I was born,' and the 'Ode to Melancholy' are of an assured immortality. His humorous verse—and in the hest of it, as in 'Miss Kilmansegg,' are often blended poetry, pathos, and even real tragic power—is of a kind that Hood absolutely created. Not only was he the most prolific and successful puncter that ever used that form of wit, but he turned it to purposes of which no one had ever supposed it capable. It became in his bands the most natural and obvious vehicle for all his better gifts. The truth is, he brought to it the transliguring power of real imagination, and, instead of its degrading whatever object it touched, in his hands it ministered to the nollest ends. Even in the 'Song of the Shirt,' when his deepest sympathics were involved, he uses the pun with almost magical effect, as where the poor needle-woman, comfined to her squalid garret when all nature is beckening her forth, exclaims:

And underneath my caves
The broading swallows ching,
As it to show me their summy backs,
And lust me with the spring

It was Hood's misfortune that the necessity of writing for bread compelled him to write constantly below his better genius. But he has left sufficient to found a durable fame as a writer of rare individuality, who, using a discredited method, made it delightful by the imagination of a true poet and the humanity of a genuine lover of his kind.

The best account of Hood's early life is to be found in his Literary Reminiscences, published in the first series of Hood's Own. The Memoir by his son and daughter as the chief source of information about his later life, but is a poor and unsatisfactury book. Later, in 1885, Mr Alexander Elliot, in a modest work entitled Hood in Scotland, has collected from persons and documents previously unconsulted some very interesting details of Hood's early residence in Daudee, and of a second visit of a few weeks paid by him to that city not long before his death.

Hoofs. The healthy soundness of the horse's foot is mainly preserved by permitting it to grow uninjured by the rasp and knife (see Horse-shoeme), and kept clean by being washed with cold water; all other applications are injurious and destroy the tongliness of the 'horseurface.' Softness and brittleness of the hoof, which are fruitful sources of cracks and Coms (q.v.), may be remedied by placing the feet for several hours daily in thick woollen swabs, kept cool and maist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary hand. Cracks, or sand-cracks, as they are termed, mostly occur amongst houses much upon the road, cause laneness, and constitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack, and perfect rest are essential. After the earlier heat and tenderness are removed a hot iron should be drawn at right nugles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the boof, and a sound growth of horn stimulated by a blister round the coronet. The horse's hoofs are too hard and coarse to be employed for the making of the better class of combs and buttons, for which purpose the hoofs of cattle, to the value of nearly £5000, are annually imported into Britain. They are, however, largely used by manufacturers of prussiate of potash and artilicial manners. See Foor.

Hooghly, or Hught, a river of Bengal Proper, the most westerly of the channels by which the Ganges reaches the sea, and commercially the most important. Taking its distinctive name near the

town of Santipur, it has a southerly course of 64 miles to Calcutta, and a further course of 81 miles in the same direction to the Bay of Bengal. Being a deltaic river, the Hooghly is much subject to being silted up, and is only kept open to navigation by the vigilant exertions of a special staff of river engineers. Even with all their care the stream is frequently dangerous, owing to shifting quicksands and moving banks and channels. In spite of these drawbacks vessels drawing 26 feet of water are safely taken up to Calentta by the Calentta pilots. At its mouth the Hooghly has a width of 15 miles. The Bone (q.v.) of the river frequently attains a height of 7 vertical feet. See map at Calcutta.

Hooghly (Hugli), a city of Bengal Proper, capital of a district, stands on the right or western bank of the river Hooghly, 25 miles by rail north of Calentia. Pop. (1881) of Hooghly with Chin-sura, immediately to the south, 31,177, mostly Hindus. Here is a college for English and Asiatie literature, which owes its existence mainly to the munificence of a native.

Hook. See Fish-Hook.

Mook, JAMES CLARKE, painter, was born in London on 21st November 1819, his mother being a daughter of Adam Clarke, the Biblical commentator. He entered as a student of the Royal Academy in 1836, gained the lirst medals in the Life and Painting Schools in 1842, and in 1845 was Academy for 'Rizpah watching the Bodies of the Sons of Saul.' He returned home after a stay of eighteen months in Italy, and for some time painted scenes from Italian history and literature, mostly connected with Venice, together with some mostly connected with venice, together with some few suggested by Shukespeare's plays and the Bible. Most of these were romantic in feeling, damatic in treatment, and brilliant in colouring. In 1850 Hook was elected an Associate of the Royal Academy, and ten years later full Academician. In the meantime he had begun to work at subjects connected with the lives of the people, more especially pieces illustrating scafaring life. His powers in this line of study, his most characris powers in this line of study, his most enaracteristic and his best, are illustrated by the 'Widow's Son going to Sea,' 'Ship-boy's Letter,' 'Coast-boy gathering Eggs,' 'Lull, Boy,' 'Carting for Farmer Pengelly,' 'Tiekling Tront,' 'A Mermaid,' amongst many others. Mr Hook is also a skilful cteher. See the Art Journal Annual of 1888.

Hook, THEODORE EDWARD, prince of jack-puddings, was born in London, 22d September 1788, second son of the Vanxhall composer, James Hook (1746–1827), by his first wife, the beautiful Miss Madden, who died in 1802. His elder brother, Dr James Hook (1771-1828), became in 1802 chaplain to the Prince of Wales, in 1825 Dean of Worcester, and was himself the author of a couple of novels. Theodore's education was almost limited to a year at Harrow and matriculation at Oxford; but while yet a minor he achieved celebrity as the author of thirteen successful comic operas and melodramas (1805-11), as a punster and matchless *improvisatore*, and as a practical joker—his greatest performance the Berners Street loker—his greatest performance the berness screen Hoax (1809), which took in the Lord Mayor, the Duke of Gloucester, and hundreds, thousands of humbler victims. Such talents claimed recognition, and in time the 'little pet lian of the greenroom' gained the entries of very high society. The Prince Regent himself remarked that 'something must be done for Hook;' and in 1812 that something was found in the nost, worth £2000 a year. thing was found in the post, worth £2000 a year, of treasurer to the Mauritius. There Hook fared gloriously, until in 1818 a grave deficiency was detected in the public chest; he was arrested and

sent, almost penniless, to England. An acquaintance, meeting him at St Helena, said, 'I hope you are not going home for your health.' 'Why,' answered Hook, 'I am sorry to say they do think there's something wrong in the chest.' Himself he ascribed the 'unfortunate defalcation' to a black elerk, who had committed suicide; anyhow, though criminal proceedings were dropped, in 1823 he was pronounced a crown debtor for £12,000, and was again sold up and arrested. In 1825 he was released from the King's Bench, but not from the debt; however, he made no effort to discharge it. Meanwhile, in 1820, he had started the Tory John Bull, whose chief aim was to vilify Queen Caroline, and which in its palmy days brought him fully £2000 per annum. Sayings and Doings (9 vols. 1824-28) yielded other £4000, and nine more three-volume novels followed between 1830 and 1839—Marwell, the half-autobiographical Gilbert Gurney, Jack Brag, &c.—four of them first appearance in the New Merkly Margarian for the linest and the Market Market Margarian for the linest appearance of the linest appearance in the New Merkly Margarian for the linest appearance in the New Merkly Margarian for the linest Merkly Margarian for the linest appearance in the New Merkly Margarian for the linest appearance in the New Merkly Margarian for the linest appearance in the New Merkly Merk ing in the New Monthly Magazine, of which Hook was editor from 1836. So he lived for a time in great style; and even after debt drove him from St James's (1831) he still dined, diced, drank, and made sport in clubs and titled houses, whilst the woman he had betrayed, the mother of his five children, was left to the loneliness of the cottage at Fullian. Shakespeare has nothing more pitiful than Hook's words to the friend who had eaught him in deshabille: 'Well, you see me as I am at last—all the bucklings, and paddings, and washings, and brushings diopped for ever—a poor old gray-haired man, with my belly about my knees. He was only lifty-two then, and a week or two later he died, 24th August 1841. He is buried in Fulham churchy ard.

See his Life and Remains, by the Rev. R. H. Dalton Barham (2 vols. 1849), and Lockhart's Quarterly article (May 1843; reprinted 1851).

HOOK, WALTER FARQUHAR, ecclesiastical his-James Hook, was born in London in 1798, son of Dr James Hook, afterwards Dean of Worcester. He was educated at Winchester and Christ Church, Oxford, took orders in 1821, and, after holding some minor preferments, was appointed vicar of Leeds in 1837. Here, mainly by his energy and authorican are fower than twenty or now. enthusiasm, no fewer than twenty one new churches were built in Leeds, as well as twenty. three parsonages and twenty-seven schools, while the parish church was rebuilt at a cost of £28,000. In 1859 Hook was made Dean of Chichester by Lord Derby. His leanings towards Tractarian-Lord Derby. His leanings towards Tractarian-ism brought him no little unpopularity; but throughout life he maintained a high ideal of devoted churchmanship. He died 20th October 1875. A memorial church at Leeds, which cost £25,000, and was designed by Sir G. G. Scott, was consecrated in 1880.

Dean Hook's works are An Ecclesiastical Biography, containing the Lives of Ancient Fathers and Modern Divines (8 vols. 1845–52); A Church Dictionary (8th ed. 1859); The Cross of Christ (1873); The Church and its Ordinances (sermons, 4 vols. 1876); and Lives of the Archbishops of Cunterbury (12 vols. 1860–76). See his Life and Letters, by W. R. W. Stephens (2 vols. 1878).

Hookah (from Arabic huqqa, through the Himhustani; the Persian kalyun; also called Nargileh, from Persian nārgāl), the water tobacco-pipe of Arabs, Turks, Persians, Hindus, and other orientals. It consists of a bowl for the tobacco, a water-bottle, and a long flexible tube ending in the mouthpiece. A wooden tube leads from the bottom of the head or bowl down into the water in the bottle, and the flexible tube is contimed downwards by a stiff tube into the space above the water in the bottle. Thus the smoke is cooled before it reaches the month of the smoker. Many of these pipes are beautifully decorated, or

even encrusted with gems. The hubble-bubble of India (named from the sound produced) is a similar but simpler water-pipe, made of a cocon-nut filled with water, and two short wooden tubes at right angles, one going into the water, the other merely passing inside the top of the shell.

Mooke, Robert, an English natural philosopher, born at Freshwater, Isle of Wight, July 18, 1635, and educated under Busby at Westminster, and at Christ Church, Oxford. He enjoyed the patronage of the Hon. Robert Boyle, and helped him to construct his air-pump. In 1662 he was appointed curator of experiments to the Royal Society, and in 1677 became its sceretary; in 1665 professor of Geometry in Gresham College, London; and after the great fire of 1666 he acted as surveyor during the works, and thus accumulated several thousand pounds, which he hid away in an old iron chest. He died at Gresham College, March 3, 1703. Hooke was a man of extraordinary inventive genins, and has justly been considered as the greatest of philosophical mechanics; the wonderful sagacity, nay, almost intuition, he showed in deducing correct general laws from meagre premises has never before or since been equalled. There was no important invention by any philosopher of that time which was not in part anticipated by Hooke. His theory of gravitation subsequently formed part of Newton's; he anticipated the invention of the steam-engino, and the discovery of the laws of the constrained motions of planets. Among his own completed discoveries are the law of the extension and compression of elastio bodies, 'ut tusio sic vis;' the simplest theory of tho arch; the balance-spring of watches and the anchor-escapement clocks; the permanency of the temperature of boiling water. The quadrant, telescope, and unicroscope are also materially indebted to him. Crooked in his person, he was upright in character, although solitary and pennrious in his liabits. His controversies with little credit.

Hooker, Mount, a peak in the Canadian Rockies, 15,690 feet high, situated on the east boundary of British Columbia.

Hooker, Joseph, an American general, was born at Hadley, Massachusetts, 13th November 1814, graduated at West Point in 1837, and served with distinction in the war with Mexico, gaining the brevets of captain, major, and lieutenant-colonel, and his captain's commission. In 1853 he retired from the army, and bought a farm in California; but in 1861 he offered his services to the Union government, and was at once appointed a brigadier-general of volunteers, and major-general in 1862. He commanded a division of the 3d corps in the Peninsular campaign, and won for himself, by his coolness and gallantry, the nickname of 'Fighting Joe.' In the battles of June 1862, during the famous 'chango of base,' his division rendered important services; and it was his defeat of Ewell (Angust 27) that compelled the enemy to evacuate Manassas. Advanced to the command of the 1st corps, he gallantly carried the position on the right of the gap at South Mountain; and he opened the battle at Antietam, where he was wounded, and won his promotion to the grade of brigadier-general in the regular army. He commanded the centre grand division in Burnside's musuccessful attack on Fredericksburg in December 1862; and in January 1863 he succeeded him in the command of the Army of the Potomac. With this force (about 120,000 men) he was confident of effecting Lee's destruction; and about the end of April, throwing a detachment of 30,000 men across the Rappalannock below Fredericksburg, he

crossed at the fords above with his main body, and marched through the Wilderness to near Chancellorsville, where he awaited Lee's attack. The Confederate troops numbered barely 50,000, but the greater part of this fonce, under Jackson (q.v.), turned the National flank, and, attacking the rear on May 2, threw part of Hooker's army into confusion. On the following day an impetrous attack by the whole Confederate line drove Hooker from the field, and he withdrew to the north side of the river. This defeat and retreat were regarded at headquarters as inexensable; and, in spite of his skilful management of his army when Lee invaded Pennsylvania, he was superseded by Meade before the end of June. In November, with the 20th corps, he gallantly carried Lookout Mountain, and took part in the attack on Missionary Ridge. He accompanied Sherman in his invasion of Georgia, and served till the fall of Atlanta. He was brevetted major-general in the regular army in March 1865, and in 1868, having become incapacitated by paralysis, retired with the full rank of orthinate in his one separate command, Hooker still retained too much self-esteem to be altogether a model lientenant; yet this failing has been nearly forgotten in the memory of his personal doubtedly important services.

Hooker, Sir Joseph. See under Hooker, Sir William.

Hooker, Richard, the greatest of English philosophical theologians, was born in or near the city of Exeter about the end of March 1554. At an early age he showed a 'quick apprehension of many perplext parts of learning,' and through the influence of his uncle, John Hooker or Vowel (1525–1601), chamberlain of the city, was brought under the notice of Jewel, Bishop of Salisbury, and sent, partly at his expense, to his own college, that of Corpus Christi, Oxford, where Walton tells us he was admitted a clerk in 1567. After his patron's death in 1571 ho was befriended by Sandys, Bishop of London, who committed his son Edwin to his care. Another pupil was George Cranner, grand-nephew of the archhishop, and both became famous men, and remained his constant friends in later life. In his nineteenth year Hooker became scholar of his college, graduated M.A. in 1577, and was soon after admitted Fellow. His progress in learning is seen by his intimacy with Henry Saville, and by his being chosen in 1579, in the illness of the Hebrew professor, to read the lecture. Three months later Walton tells us that he was for a short time expelled by the vice-president for some forgotten college quarrel, along with his intor and friend, Dr John Rainolds, but soon after restored. After about three years' residence he took orders, and cre long was appointed to preach at St Paul's Cross. This necessity appears to have been a severe ordeal to his modost nature, the more so that the weather proved very unfavourable for his journey; but, says Walton, 'a warm bed, and rest, and drink proper for a cold, given him by Mrs Churchman the Sinnamite at whose house the preachers were lodged], and her diligent attendance added unto it, enabled him to perform the office of the day, which was in or about the year 1581.' But the scheming widow's kindness proved too much for the simple-minded scholar. He was led into a marriage with her danghter Joan, who brought him neither beauty nor portion, was 'clownish and silly' in Wood's phrase, and, what was wors

Buckinghamshire, whither he had retired. They found him tending the sheep, his Horace in his hand, and not long after they reached the house Richard was called from their company to rock the cradle. Soon after this Hooker was transferred, at the recommendation of Archbishop Sandys, and through the influence of Whitgift, to the Mastership of the Temple, against a strong effort made to promote the afternoon reader Travers, a prominent Puritan leader. The union of the colleagues, as Travers was the more popular preacher, if the less profound thinker, and Fuller tells us that the congregation in the Temple elibed in the forenoon and flowed in the afternoon.' The ser-mons of Travers soon became attacks upon what he considered the latitudinarianism and errors of Hooker, and, indeed, as Fuller says pointedly elsewhere, 'the pulpit spake pure Canterbury in the morning, and Geneva in the afternoon,' a state of matters that Whitgift soon put an end to by sileneing Travers. The hery Puritan appealed to the Council with a series of set charges against Hooker's doctrine, and Hooker answered him with masterly conclusiveness and temperance. But having been drawn into this personal controversy against his inclination, he felt it to be his duty to set forth the larger question of the real fundamental basis of all church government, and to this end desired Whitgift to remove him to some quiet living, 'where I might behold God's blessing spring out of my mother earth, and cat my own bread without oppositions. Accordingly, in 1591 he accepted the living of Boscombe, six miles from Salisbury, becoming also sub-dean and prebendary of Sarmn; and here he finished four of the proposed eight books of the Laws of Ecclosiastical Polity, which were, however, not published till 1594 in a small closely printed folio. The year after be removed to the living of Bishopshorne, three miles from Canterbury, where he remained till his deadl, unconseions of his growing fame, a parish priest of unoxampled humility and devotedness. His fifth book appeared in 1597, but the author did not live to complete his work, being the treatment of a calculation. dying about the end of the year 1600, of a cold caught in a passage by water betwixt London and Gravesend. Almost his last words were upon the 'blessed chedience and order of the angels, without which peace could not be in heaven, and, oh that it might be so on earth!' He was buried in his own church, and left his widow and four daughters he-hind him. Sir William Cowper, great-grandfather of the first Earl Cowper, built him a monument in Borne church, and in a poetical epitaph of his own composition applies to Hooker the famous term judicious, which will never be dissociated from his name.

At the time of his death the last three books were believed to he nearly complete, but if so, they were soon lost, the blame of which was laid, apparently with some justice, upon Hooker's widow and her Puritan relatives, who were supposed to abhor the theology contained in them. Some months after his death the rough drafts of the completed books that remained were reluctantly given up to the archbishop, and by him ontrusted to Hooker's friend, Dr Spenser, to prepare for publication. The latter reprinted the first five books in 1604, but his further labours were interrupted, and after his appointment to be president of Corpus (1607), he entrusted the papers for transcription to a young scholar named Henry Jaekson, who issued some of the Sermons (1612–14). But Spenser died in 1614, bequeathing the papers 'as a precious legacy' to Dr King, Bishop of London. Soon after his death in 1621 they were claimed by Ahlot for Lambeth Library, where they remained till Laud's committal for high-treason, when the library was handed

over first to the custody of Prynne, next of Hugh Peters. Thereafter the fate of the original papers is nuknown. In 1648, as Wood tells us, but more likely in 1651, the sixth and eighth books were published at Loudon, described as according to the most authentique copies,' and, indeed, we have good grounds for believing that this text is substantially genuine, being to a certain extent guaranteed to us by Bishop Andrewes and Archbishop Ussher. But, unfortunately, as Keble points out, in its present form the sixth book is an entire deviation from its subject, which should have been, according to the plan of the whole treatise, a discussion of the elaim of lay elders to a share in church government, whereas about nineteen-twentieths of the whole is taken up with a series of dissertations on Primitive and Romish penance, in their several parts, con-fession, satisfaction, absolution. Now Hooker's discussion of lay elders would be just the part of his work most displeasing to the Puritans of his time, and the presumption is perfectly reasonable that this part of the original work was destroyed. At the same time, as Keble points out, the sixth book bears every mark of being Hooker's work, though Polity. The seventh and eighth books however, hear every mark of being substantially gennine; the former appeared first in 1662, in the new edition of Hooker issued by Ganden, the soi disant author of the Eilon Basilile, and not entirely a reassuring editor. The famous Life by Walton was written for a second edition, issued in 1666, in order to correct the inaccuracies in the life provided by Gauden. Walton's account of the saintly and simple-minded theologian is one of the finest pictures in the whole range of English biography, lint it should be remembered that in this case he was not sketching from life, and Keble pointed out that the super-simplicity and excessive meckness and temperance attributed to him harmonise ness and temperance attributed to him harmonise hut indifferently with the masterly intellect, the incisive irony, and keen humour that were in Hooker. All earlier editions of Hooker's works were superseded by that of Keble, published by the Clarendon Press, Oxford, in 1836, containing also Walton's Life and an exhaustive preface from his own pen. Of this work the 7th edition, revised by Dean Clurch and Canon Paget, was issued in three volumes in 1888. Of the first book alone there is an edition, with an admirable introduction and nates, by Dean Church (1868).

Hooker's Laws of Ecclesiastical Polity is the

Hooker's Laws of Ecclesiastical Polity is the carliest great philosophical work written in the English tongue, and is a noble monument of massive prose no less than of profound thought and masterly The style is neither artificial nor involved but as well ordered and well sustained throughout as the thinking itself, while it is capable of a grave and modulated rhythm that rises at times into the region of serene yet impassioned eloquence. As a thinker he is Judicions in the highest sense of the word, and his work forms a broad and enduring foundation adequate for the church of a great nation. Its fundamental idea is that of the unity and all-embracing nature of law, considered as the manifestation and development of the divine order of the universe. The paramount law which dominates the universe is itself but the outward expression of the government of God, and is ever identical with ealm and temperate reason. Reason is the criterion by which even revelation is to be distingnished as to what is eternal and immutable and what is variable according to the necessities of expediency. There is a broad distinction between expediency. natural and supernatural law, but both supplement and complete each other, both bave their place in the interpretation of the ways of God to man. Anthority must ever be allowed great weight in the

772 HOOKER

government of the world, but it must ever be kept in harmony and conformity with reason. A necessity of polity may be held in all churches and governments without holding any one fixed form to be necessary, for these forms are not natural but positive, and therefore alterable and subject to expediency as interpreted by temperate reason. But the eternal facts of morality are necessary and self-evident postulates of the divine government of the world, and thus rest on verities that cannot be shaken. The whole furnishes a conclusive answer to the Puritan extreme and exaggeration of the central position of Protestantism, the making of Scripture the sole guide of human conduct, which rests and depends rather on the concurrence and co-operation of all the various sources of knowledge that Divine Providence has provided for man. It is not too much to say that it is mainly to Hooker's work that Anglican theology owes the tone and the direction that it has never since entirely lost.

His first book is built on a broad foundation of first principles; his second and third form polemic corollaries to the first; and in the fourth and fifth we have his detailed defence of clurch discipline and ritual; while the last two contain a defence of its government and its relation to the state. The lifth book is a complete apology for the Anglican Church and its usages, stamped throughout with characteristic breadth and wisdom. Hooker maintains the high religious value of ritual interpreted by the principle of symbolism, and kept in harmony with primitive usage so as to carry with it the weight of undivided authority, yet asserts the right of the living authority within the church itself both to enact and to dispense, in order to avert anarchy and disruption. In his defence of Episcopacy in the seventh book he shelters himself behind no divine right or assumption of formal scriptural authority, but maintains its superiority as a form of church government, both from its undeniable antiquity and its practical utility in actual experience. In his eighth book Hooker discusses the question of the royal supremacy and the mutual relations of clurch and state. To him, as to Arnold and Stanley, church and state are merely co-extensive terms, and men owe civil duties to the whole community as a state, spiritual duties to it as a church. The rayal supremacy is nothing more than the assertion of national unity and independence as against mere sacerdatal pretensions, the whole bady politic under its executive head, the crown, being equally con-cerned in the framing of all laws affecting the church, itself considered but as a part of a greater whole. On this question modern conditions have entirely shifted the bases of discussion, and, whether rightly or wrongly, Hooker's dream of a church and state one and indivisible now seems to Englishmen little more than a devont imagination.

Hooker, Thomas, one of the founders of Connecticut, was born at Markfield, Leicestershire, in 1586, studied at Cambridge, and became a Fellow of Emmanuel College, and was for four years a curate at Chehnsford. Ejected for nonconformity, he lived in Holland until 1633, when he went to Massachusetts, and received a charge at Cambridge. In 1636 he removed with his congregation to Connecticut, and founded the town of Hartford, where he died, 7th July 1647. Hooker was a man of great influence in New England, and published many sermons and polemical works. A selection, with a Life, was printed at Boston in 1849.

Hooker, Sir William Jackson, a celebrated English botanist, was born at Norwich in 1785. Of independent means from an early age, he devoted himself to natural science. His first work was a Journal of a Tour in Iceland in 1811, written from memory, his diaries and collections having been

burned. It proved so popular that a second edition was called for in 1813. He married in 1815, and settled first at Halesworth in Suffolk, but was appointed by the crown to the chair of Botany at Glasgow University in 1820. In 1841 he was appointed director of the Royal Gardens at Kew, and his energy and enthusiasm extended it enormonsly. He was made K.H. in 1836. Already F.R.S. in 1810, he became later D.C. L. of Oxford, LL.D. of Glasgow, and an honorary member of most foreign scientific societies. He exercised much influence in botanical appointments and in naming naturalists to accompany exploring expeditions. His herbanium and his admirable library were given to Kew. He died August 12, 1865. His name survives in Mount Hooker in the Rocky Mountains, and in Hookeria, a natural order of mosses.

His British Jungermannur (1816); his edition of Curtis's Flora Londinensis (1817-28); Muscologia Britannica (1818), in conjunction with Dr T. Taylor; and Musci Ecotor (1818-20) were his chief early work. Later books were Ecotor Flora (1822-27); the British Flora, with Dr Walker-Arnot (1830); Jeones Filtenn, with Dr Greville (1829-31); Icones Flantarum (1837-54); Species Filterm (1846-64); and Filices Ecotice (1857-59). Vet he found time in his busy life to edit the Bolanical Magazine (1827-65), the London Journal of Bolany (1842-18), and the Journal of Bolany and Ken Miscallany (1849-57).

SIR JOSEPH DALTON HOOKER, son of the preeeding, and also an eminent naturalist, was born at Halesworth in Snffolk, June 30, 1817. He was educated at the High School and university of Glasgow, and graduated as M.D. there in 1839. He next joined the antarctic expedition of the Erchus and Terror, returning after a four year absence to superintend the publication of his magistral Flora Interactica (1844-47), Flora Nova Zelandia (1853-55), and Flora Tusmania (1869). He acted for some time as substitute for Professor Graham in the chair of Botany at Edinburgh University, was appointed in 1846 botanist to the Geological Survey of Great Britain, and next year started on a botanical expedition to the Himalayar, which occupied him for three years. His Humalayar Journals (1854) contains the marrative of this expedition, and the Rhododendrons of the Sikkim-Himadaya (1849-51) illustrates the most remarkable additions which he made to the ornamental plants of our gardens on this occasion. With Dr Thomson of the Calcutta Botanic Chardens he undertook a Flora Indica (vol. i. 1855), still a splendid fragment. He published later a flora of British Indica (vol. i. 1855), still a splendid fragment. He published later a flora of British Indica (vol. i. 1857) he made an expedition to Morocco, ascended the Great Atlas, the summit of which heal never before been reached by a European, and brought back a valumble collection of plants. His Tour appeared in 1878. In 1877 he aecompanied Dr Asa Gray in a scientific tour through Colarado, Utuh, and California.

Dr Hooker was appointed assistant-director at Kew Gardens in 1855, and on the death of his father in 1865 he succeeded leim as director. He succeeded him also in those liberal ideas which have made Kew the real centre of the botanienl world. He was president of the British Association meeting at Norwich in 1868, and in his much debated address professed binnself entirely an adherent of Darwin. From 1873 to 1878 he was president of the Royal Society, was made C.B. in 1869 and K.C.S.I. in 1877. He is also LL.D. of Cambridge, Dublin, Edinburgh, and Glasgow, and D.C.L. of Oxford. One of his best-known works is his useful Students' Flora of the British Islands (1870); his most important, the Genera Plantarum, in conjunction with George Bentham (3 vols. 1862–83). See an article in Nature (vol. xvi.)

Hooks and Eyes. These dress-fasteners were used much more largely about 1860 and for some length of time previously than they are now, owing to a change in the fashion of ladies' dresses by which buttons have to a great extent taken their place. Hooks and eyes were formerly made by hand by bending the wire of which they are formed into the proper shape with pliers. But for many years they have been made by machines, which are complex in their details. By one kind of machine the wire is first drawn off a reel, next on machine the wife is first drawn of a reet, next cut to the required length, then by a sinker forced into a slot by which it is bent, and at the same time the two ends are formed by cams into the lateral loops. This is the process for an eye, but a hook requires an additional bend, and this is produced by another slot and sinker. Makers of these duced by another slot and sinker. Makers of these articles do not, however, all use the same kind of machines. See also Fish-hooks.

Moole, John, translator and dramatist, was born at Moorfields, London, in 1727, and at the age of seventeen became a clerk in the East India of seventeen became a clerk in the East India House, where he remained until 1783. He published translations of the Jerusdem Interred (1763) and Rivaddo (1792) of Tasso, the dramas of Metastasio (1767), and the Orlando Farioso of Ariosto (1773–83). This last Southey speaks of as 'that vile version of Hoole's,' and Scott describes the translator himself as 'a noble transmiter of gold into lead.' His dramas were Cyrus (1768), Timanthes (1770), and Chemice (1775)—all of them failures, although Johnson, who was Hoole's friend and spoke well of his verses, praises the last in a complimentary letter. Hoole died 2d April 1803.

Hoon Ash. See NETTLE-TIME.

HOOD Ash. See NETTLE-TREE.

Hooper, John, an English bishop and martyr, was born in Somersetshire about 1495, and educated at Merton College, Oxford, whence in 1518 he passed to a Cistereian monastery at Gloucester. The reading of Zwingli made him a Reformer, and having for some time served as chaplain to Sir Thomas Arundel he twice went, in 1539-40, for safety's sake to the Continent, and after trayelling in France and Germany married and settled for three years at Zurich. In 1549 he returned to England, and became a popular preacher in London. In 1550 he was appointed Bishop of Cloucester, and for his diffi-ealty about the eath and his objections to wearing the episcopal habit was imprisoned for some time in the Fleet. His lahours as a bishop were incessant, and he wore out nature in devotion to his duty. In 1552 he received the hishopric of Worcester in commendam. Next year at the commencement of Mary's reign he was committed to the Fleet, and after oighteen months' imprisonment was tried for heresy and condemned to death. He was burned at the stake at Gloucester, February 9, 1555, his sufferings being much prolonged by the use of green wood. His Early Writings were edited by the Rev. Samuel Carr in 1843; his Later Writings, by the Rev. Charles Novinson in 1852, both for the Parker Society.

Hooping-cough (or Whooping-cough; teehnically, Pertussis) is an infectious and epidemic disease, mostly attacking children under ten, especially in spring and antunin. Its earliest Its earliest symptoms, which usually appear five or six days after exposure to infection, are those of a common cold, as hoarseness, a watery discharge from the eyes and nose, oppression of the chest, a short dry cough, and more or less feverishness. This stage, which is called the catarrhal, lasts a week or ten days, when the fever remits, and the cough becomes more troublesome, is worse at night, and occurs in paroxysms consisting of a series of short expiratory pulls followed by a deep

inspiration of air through the contracted cleft of the glottis (Lavynx, q.v.), causing the characteristic whoop. The attack usually terminates in the expectoration of glairy mucus or in vomiting. During the fit of coughing the face becomes red or livid, the eyes project, and the child seizes some person or object near him for support. These paraxysms occur at uncertain intervals, and between them the child returns to his play, takes his food with good appetite, and exhibits little or no sign of illness. The disease reaches its height at about the end of the fourth week, after which the paronysms diminish in frequency, and the patient shows signs of improvement. The second stage may last from two to eight weeks, and, if no relapse occur, is succeeded by what may be termed the convalescent stage, the duration of which is very variable.

This is one of those diseases which seldom occur more than once in a lifetime; and hence it probably is that, as few children escape it, it is comparatively rarely noticed in adults. Mobile anatomy has failed to throw any direct light upon its special seat. The proportion of deaths to recoveries has not been satisfactorily determined, but when there is a severe epidemic the mortality due to this disease is often very great, the prospect being worse in the very young and in patients affected with rickets. This mortality is in reality due rather to the bronchitis, pneumonia (or inflammation of the lungs), and convulsions, which are frequent complications of hooping-cough, than to

the disease itself.

The treatment of hooping cough consists in general measures to prevent complications, and in special treatment for shortening the disease and duninishing the violence of the spasms. The child should be kept in the house with the temperature about 60° F., while quiet and the avoidance of excitement must be enforced. The diet should be simple, untritions, and not too starchy. If the natural vomiting be not sufficient to relieve the chest and stomach of nincus an occasional emetic of ineeaenantha or sulphate of copper must be given. The bowels should be kept moderately open. In the catarrhal stage a simple expectorant is all that is nceded, lint when the whoop is developed give belladouna in large doses. Alkalies are also useful, and bromide of ammonium if nervous symptoms complicate the spasms. As hooping cough has the characteristics of a germ disease, antiseptic inhalations and sprays seem to offer good ground for hope in shortening the malady. Stimulating liniments such as Roche's Embrocation are useful if the catarrh of the chest is severe, and in the stage of decline alum is of henefit internally. During convalescence nothing is so important as a change of air, while precautions are taken against glandular enlargements by building up the system.

Hoopoe (Upupa), a genus of semi-terrestrial insectivorous birds of the family Upupide, tribe Tennirostres, and order Insessores, most nearly related to the Hornbills, but presenting a strong contrast to those ungainly birds by their graceful carriage, elegant figure, and beautiful crest. They are most characteristic of the Ethiopian region, but they are found in central and southern Enrope and they are found in central and southern Europe and in Asia as far as Ceylon and Mongolia. The six species are most at home in desert country, where their sand-coloured plumage is a protection to them. The Common Hoopoe (*Upupa epops*) is about a foot long; its plumage exhibits a fine mixture of white, buff, and black; on the tawny-coloured head is an enough a greatile most, the feethers of which is an enormous erectile erest, the feathers of which have a black tip beyond a narrow white bar. The plumage of the female is a little paler in colour than that of the male. This bird visits Britain during the spring and autumn migration, but

seldom breeds in any part of the island. Hoopoe derives its name from the very frequent



Common Hoopoe (Upupa epops).

ntterance of the sound hoo-hoo-hoo which it produces, pufling out the sides of its neck and hammening on the ground with its bill at each note.

Hoops. See Crinoline.

Hoops. See CRINOLINE.

Hoorn, a decaying town and scaport of North Holland, on a bay of the Zuider Zee, 27 miles NNE. of Amsterdam by rail. In the 17th century it had 20,000 inhabitants, and still it is full of antique carved houses; but, like the other 'dead cities of the Zuider Zee,' it has greatly fallen off in prosperity. There is still, however, a trade in butter and cheese. Here the large nets for herring fishing were invented. Pop. 11,311.

Hoosac Mountain, a part of the Green Mountain range in western Massachusetts, through which is pierced the most notable railway tunnel in America. The Hoosac tunnel, which has a length of very nearly 5 miles, was commenced in 1851 for the line between Boston and Albany, was twice abandoned, and was finally opened in 1875, having cost the stato of Massachusetts about \$18,000,000. See Tunnel.

Hoove, or distention of the stomachs, but particularly of the rumen or first stomach, with gas, is a common complaint among eattle and sheep, and results from the eating of food to which the animal has been nnaecustomed, from wet clover or vetches, or from any easily fermentable Relief generally follows walking exercise, friction on the belly, and a dose of any ordinary stimulant, which for a cow may consist of a couple of ounces of turpentine, whisky, ether, or ginger, to which should also be added, in order to clear the bowels of the offending food, a laxative, such as a pint of oil or a pound of salts. A fourth or fifth of these quantities will suffice for sheep. The introduction of the probang, with the small end downwards, allows the escape of gas when there is little food in the stomach. If simple remedies fail, the breathing becomes distressed and the animal stupid; the gas may with safety be allowed to escape by an external opening made at a point intermediate between the last rib, the lumbar vertebre, and the prominence of the haunch, either with a cannla and trochar or a large pocket or table kuife. For several days after an attack of hoove the digestive organs are apt to be easily deranged, and the animal must have soft and digestible food, and an occasional dose of simple laxative medicine.

The horse's bowels when distended with gases are now punctured with the best results.

Hop (Humulus lupulus), a perennial diccions plant of the natural order Cannabinacere, the only species of its genns. It has long, rough, twining stems, and stulked 3- to 5-lobed rough twining steins, and is a plant of luxuriant growth and abundant foliage. The male flowers grow in loose lnanching axillary panicles, and consist of five stamens surrounded by a 5-tobed perianth. The tennale flowers are in strobules, or cones, with large persistent, concave, entire scales, which enlarge as the finit ripens. The part of the hop so much used in brewing, and sold under the name of hops, is the ripened cone of the female plant. Female plants alone, therefore, are enlitvated to any considerable extent, it being enough if a few male plants are scattered over a field.

The hop is first mentioned by Pliny as one of the garden plants of the Romans, who ate the young shoots as we eat asparagus; as, indeed, many country people in England do at the present day. It is a native of Europe and of some parts of Asia, a doubtful native of Britain and of North America. It is extensively cultivated in the south of England, the total area under hops being 66,696 ot England, the total area under hops being 66,696 aeres in 1880, and 57,724 in 1889 (Kent, 33,487; Snssex, 7282; Hereford, 6850; Worcester, 2939; Hants, 2905; Surrey, 2101, &c.). Hops are also grown to a considerable extent in Germany (116,000 acres), France, Flanders, and sonthein Russia, and now successfully in the United States (46,800 acres in 1880; about four-lifths in western New York), and in Australia and New Zealand New York), and in Australia and New Zealand.

The cultivation of the hop was introduced into England from Flanders in the time of Henry VIII., but did not become sufficient for the supply of the kingdom till the end of the 17th century. For some time after hops began to be used in brewing a strong prejudice existed against the innovation:



Hop (Humulus lupulus).

and parliament was petitioned against hops, as 'a wicked weed, that would spoil the taste of the

drink, and endanger the people.

The hop requires deep rich soil on a dry bottom, and succeeds best in a sheltered situation with a south or south-west aspect; yet there should be a free circulation of air. The ground is generally well pulverised and manured to a considerable depth by the plough or spade before planting. The plants are usually set in stools of from three to live, a few inches apart, in rows six feet asunder, with the same space between the stools. They are obtained from enttings or suckers taken from the

healthiest old stools, and are usually planted out somewhat closely in musing lines for twelve months before being planted permanently. They make very little growth the first year, and not until the third year do they come to full bearing, when from four to six poles from 14 to 18 feet long are required for each stool. The most favoured timber for hop-poles is Spanish chestnut, which is extensively grown in hop-districts as coppice-wood for this purpose. The poles are set to the plants in spring before growth commences, and removed when the stalks are ent away in antinum. The plants are then dressed with manure, and the soil between the stools is stirred lightly with the fork. In Germany the poles are fewer and much taller than in England—from 23 to 27 feet high.

The cones are known to be fit to gather when

they acquire a brown amber colour and firm consistence. The stalks are then cut at the base, and removed along with the poles and laid horizontally on frames of wood, to each of which is attached by tenter-hooks a large bag-like cloth into which the hops fall as they are picked by women and chilhops fall as they are picked by women and children, who are employed in great numbers at this work. When picked the hops are immediately conveyed to the kiln to be dried, as otherwise they are liable to heat and become spoiled in a few hours, especially when they are picked in a moist state. The operation of drying hops is similar to that of drying malt, and the kilns are of the same construction. Great care is required in drying to prevent exception by which the in drying to prevent overheating, by which the essential oil is liable to be volatilised. The hops are spread on hair eloth from 8 to 12 inches deep, and when the ends of the stalks have become shrivelled and dry they are taken off the kiln, and laid on a wooden floor till they become quite cool, when they are put in bags or pockets.

The produce of no British crop is more precarious than that of the hop. In a good season it may be as much as 20 cwt. per acrc, in a bad season none or at most perhaps 2 or 3 cwt. The plant has many enemies, both insect and fungoid parasites, which prey upon it, and destroy the crop season after season. It is calculated that on an average the hop-crop fulls every five or seven years. This, in conjunction with the heavy expense of the first formation of a plantation, precludes any but those having considerable capital from taking up its cultivation. But the produce of plentiful years, if properly preserved, may be kept to meet the demand when scarcity may raise the price from £2 or £3 to £20 or £30 per cwt; consequently to these who can write faw gives are conclled wroth. those who can wait few crops are equally profitable.

The hest varieties of the hop are the Hill Golding, the East Kent Golding, Golden Hops, Jones's Hops, Grape Hops, and Farnham White Bine. The Goldings are the best and richest. The Jones's are valued for their habit of short growth, requiring shorter poles. The Colegates and Grape Hops are hardy and prolific on poorer soil than any of the others. the others.

The fibre of the stems is employed to some extent in Sweden in the manufacture of a coarse kind of cloth, white and durable; but the fibres are so difficult of separation that the stems require

to be steeped in water for a whole winter.

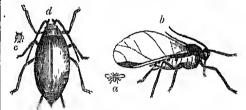
The fruit of the hop is a little nut, not larger than a grain of mustard-seed, and between its outer shell and the kernel there is a small quantity of a peculiar granular substance which also exists as a sort of elllorescence on the surface of the seales themselves; much of the value of the hop depends upon the abundance of this substance. It is not a niere powder, but each grain is a little organised cellular body, of an oval or round form, and, when seen under the microscope, having a reticulated

The powder contains some 10 per cent. of tupuline, the bitter principle to which hops seem to owe their tonic properties. The oil of hops is sedative, anodyne, and narcotic; the pleasantly aromatic odour has somewhat of the same qualities, hence the value of pillows stuffed with hops in cases of mania, sleeplessness, &c. The litter principle is not narcotic, but tonic. The oil and litter principle combine to make hops more useful than camomile, gentian, or any other bitter, in the manufacture of beer; hence the medicinal value of extra hopped or bitter beer. The tannic acid contained in the strobiles or cones of flowers also adds to the value of hops, particularly as causing the precipitation of vegetable mucilage, and consequently the clearing of beer. Hop bitters are used as a tonic. See also

Until the year 1862 hops paid an excise duty, and formed an important part of the revenue, although a very variable crop, owing to the serions check it is liable to from insects, fungi, diseases, and the weather. Large quantities of hops are imported into the United Kingdom for home use and for exportation to the colonics and other countries. In 1888 hops imported amounted to 216,606 cwt. of a declared value of £799,391. The annual exportation of hops is about 20,000 cwt., chiefly to Australia, Belgium, and the United

HOP-FLEA, or TOOTH-LEGGED BEETLE (Phyllotreta or Haltica concinna), a very small colcopterons insect, not quite one tenth of an inch long, which often does much mischief in hop-plantations in spring, devouring the tender tops of the young shoots. It is of the same gems as the turnip-fly (Phyllotreta nemorum), so destructive to turnips.

Hop-fly (Aphis or Phorodon humuli), a species of Aphis (q.v.) or plant louse, important on account of the injury it inflicts in some seasons on the hop-plantations. The general colour is pale green, as the common name 'green fly' indicates.



Hop Aphis (Aphis humuli): a, b, winged female, natural size and magnified; c, d, larva or 'nit,' natural size and magnified (from Miss Ormerod).

The males, which are winged, appear in autumn, and pair with wingless females. These lay eggs, which develop next spring into swarms of winged females. These produce partheno-genetically and viviparously great numbers of larve, 'lice' or 'nits,' which usually remain wingless, but rapidly mature, and soon become the virgin and viviparous parents of fresh swarms. Males and and viviparous parents of fresh swarms. Mates and sexual reproduction reappear in autuum. Both larvre and adults ruin the plants. No efficient method of preventing the ravages of this post has yet been discovered; but the beneficial service to man of lady-birds and other natural foes of this fly has been long and widely recognised.

Hope, Thomas, author and connoisseur, was born in London in 1774. While still a youth he travelled over a large portion of Europe, Asia, and Africa, and collected many drawings, chiofly of buildings and sculptures. In England he first buildings and sculptures. In England he first attracted attention by the splendid decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appeared in his book on Household Furniture (1805). In 1809 he published Costume of the Ancients and Architecture of Theatres, in 1812 Modern Costumes, and in 1819 (anonymously) Anastasius, or Memoirs of a Modern Greek at the close of the 18th Century. This last work is his masterpiece, and hy many was ascribed to Lord Byron, who was greatly flattered by the rumour. It is certainly a brilliant and erudite performance; still it wants the dramatic vis of a gennine work of genius. Hope died 3d February 1831, leaving behind him a very heterodox but rather cloquent essay On the Origin and Prospects of Man (1831), and an Historical Essay on Architecture (1835).

His third son, ALEXANDER JAMES BENESFORD-HOPE, born in 1820, was educated at Harrow and Trinity College, Cambridge, where he graduated B.A. in 1841. He was twice Conservative member for Maidstone (1841–52, 1857–59), and for Cambridge University from 1868 till his death on 20th October 1887. In 1880 he was sworn a privy-conneillor, and in 1881 Dublin University created him an honorary LL.D. A zealous High-Churchman, he was the principal founder of St Angustine's missionary college at Canterbury (q.v.), and published several works on church topics, as well as two novels, Strictly Tied Up (1880) and The Brandreths (1882). He was also a proprietor of

the Saturday Review.

Hope-Scott, J.MES, third son of the Hun. Sir Alexander Hope, and grandson of the second Earl of Hopetoun, was born at Marlow in 1812, and from Eton proceeded to Christ Church, Oxford. He contented himself with a pass degree (1832), but got a fellowship at Merton; and, called to the bar in 1838, soon made a great parliamentary practice. In 1847 he married Miss Loekhart, on whose succession six years later to Abbotsford he assumed the additional surnance of Scott; and in 1851 both he and his wife were admitted into the Roman communion. He died in London, 29th April 1873. His Life by Robert Ornsby (2 vols. 1884) is specially interesting for the glimpses it gives of men greater than himself, as Cardinal Newman and Mr (fladstone.

Hôpital, MICHEL DE L'. See L'Hôpital.

Hopkins, Johns, was born, 19th May 1795, in Anne Arundel county, Maryland, where his parents, Quakers, gave him a fair education and the training of a farmer. At the age of seventeen, however, he went to Baltimore, there became a groeer, and in 1822 founded the house of Hopkins and Brothers. From the groeer's business he retired in 1847 with a large fortune, which he employed in banking and railway operations. In 1873 he gave property worth \$4,500,000 to found a free hospital; he presented Baltimore with a public park, and he also gave over \$3,000,000 to found the Johns Hopkins University in Baltimore (q.v.). He died December 24, 1873.

Hopkins, Samuel, D.D., an American theologian, was born at Waterbury, Connectient, September 17, 1721. Having graduated at Yale College in 1741, be studied theology with Jonathan Edwards, and from 1743 to 1769 was settled as pastor of Housatonnuc (now Great Barrington), Massachusetts. He then removed to Newport, where he died December 20, 1803. His writings include a life of President Edwards, sermons, addresses, a treatise on the millennium, and his System of Doctrines (1793); these were republished with a memoir by Dr E. A. Park at Boston (3 vols. 1854); and an carlier edition (1805) contains some autobiographical notes. Hopkins, who is said to be the hero of Mrs Beecher Stowe's Minister's

Wooing, was remarkable for his simplicity, devontness, and unselfishness. Those who adopt the Hopkinsian theology are not a distinct sect, but are pretty numerous in America, in some of the Christian bodies of which the tenets are generally Calvinistic. They hold most of the Calvinistic doctrines, and even in their most extreme form, but they entirely reject the doctrine of imputation, both the imputation of Adam's sin and of Christ's rightenness. The divine efficiency extends to all acts whatsoever, and sin itself under the guidance of divine providence is merely a necessary means of the greatest good. The fundamental doctrine of the Hopkinsian system, however, is that all virtue and true holiness consist in disinterested benerolence (involving unconditional submission), and that all sin is selfishness—the self-love which leads a man to give his first regard even to his own eternal interests being condemned as sinful.

Hoppner, John, R.A. (1759-1810), was born at Whitechapel of German parents. Under the patronage of the Prince of Wales he became a fashionable portrait-painter and the rival of Lawrence.

Hop-tree (Ptelea trifoliata), an American shrub of the rue family (Rutaceae), also called Shrubby Trefoil, is planted as an ornamental plant. Its fruit is intensely bitter, and is a poor substitute for hops.

Hor, Mount. See Edom.

Horace. Quintus Horatius Flaccus, Latin poet and satirist, was born near Venusia in southern Italy, on the 8th December 65 B.C. His father was a mamunitted slave, who as a collector of taxes or an auctioneer had saved enough money to buy a an attendancer had saved choigh money to the same class and estate, and thus belonged to the same class of small Italian freeholders as the parents of Virgil. Apparently Horace was an only child, and as such received an education almost beyond his father's means; who, instead of sending him to school at Vennsia, took him to Rome, provided him with the dress and attendance customary among boys of the upper classes, and sent him to the best masters. At seventeen or eighteen he proceeded to Athens, then the chief school of philosophy, and one of the three great schools of oratory, to complete his education; and he was still there when the murder of Julius Casar, 15th March 44 B.C., rekindled the llames of civil war. In the autumn of this year Brutas, then propertor of Macedonia, visited Athens while levying troops. Horace joined his side; and such was the scarcity of Roman officers that, though barely twenty one and totally without military experience, he was at once given a ont initiary experience, he was at once given a high commission. He was present at the battle of Philippi, and joined in the general flight that followed the republican defeat; he found his way back to Italy, and apparently was not thought important enough for proscription by the triumvirate. His property, however, had been confiscated, and he found employment in the lower grade of the civil service to gain a livelihood. It was at this period that, noverty, he says, drove him was at this period that poverty, he says, drove him to make yerses. His earliest were chiefly social satires and personal lampoons; but it was probably from some of his lirst lyrical pieces, in which he showed a new mastery of the Roman language, that he became known to Varius and Virgil, who in or about 38 B.C. introduced him to Meecnas, the confidential minister of Octavianus, and a numificent patron of art and letters. The friendship thus formed was uninterrupted till the death of Mæeenas, to whose liberality Horace owed release from business and the gift of the celebrated farm among the Sabine hills. From this time forward his life was without marked incident. His springs and summers were generally spent at

HORACE

Rome, where he enjoyed the intimacy of nearly all the most prominent men of the time, his antumns at the Sabine farm or a small villa which he possessed at Tibur; he sometimes passed the winter in the milder seaside air of Bane. Mucenas introduced him to Augustus, who, according to Snetonins, offered him a place in his own honsehold, which the poet prudently declined. But as the unrivalled lyric poet of the time Horace gradnally acquired the position of poet-laureate; and his ode written to command for the celebration of the Secular Games in 17 B.C., with the official odes which followed it on the victories of Tiberius and Drusus, and on the glories of the Angustan age, mark the highest level which this kind of poetry has reached. On the 27th November 8 R.C. he died in his fifty-seventh year. Virgil had died eleven years before; Tibullus and Propertins soon after Virgil; Ovid, still a young man, was the only considerable poet whom he left behind; and with his death the great Augustan age of Latin poetry ends.

The following is the list of Horace's works, arranged according to the dates which have been most plausibly fixed by scholars. Some of the questions of Haratian chronology, however, are still at issue, and to most of the dates now to be

given the word 'about' should be prefixed.

The first book of Satires, ten in number, his earliest publication, appeared 35 B.C. A second volume of eight satires, showing more maturity and finish than the lirst, was published 30 B.C.; and about the same time the small collection of lyrics in tambic and composite metres imitated from the Greek of Archilochus, which is known as the *Epodes*. In 19 B.C., at the age of forty-six, he produced his greatest work, three books of *Odes*, a small volume which represents the long labour of years, and which placed him at once in the front rank of poets. About the same time, whether before or after remains nucertain, is to be placed his incomparable volume of Epistles, which in grace, case, good sense, and wit mark as high a level as the Odes do in terseness, melody, and exquisite finish. These two works are Horace's great achievement. The remainder of his writings demand but brief notice. They are the Carmen Secular ulready noticed; a fourth book of Odes, with all the perfection in style of the others, but showing a slight decline in freshness; and three more epistles, one, that addressed to Florus, the most charming in its lively and graceful ease of all Horace's familiar writings; the other two somewhat fragmentary essays in literary criticism. One of them, generally known as the Ars Poetica, was perhaps left unfinished at his death.

In his youth Horace had been an aristocrat, but his choice of sides was perhaps more the result of accident and association than of conviction, and he afterwards acquieseed without great difficulty in the imperial government. His acquicseence was not at first untempered with regret; and in the Odes modern critics have found touches of veiled sareasm against the new monarchy, and even a certain sympathy with the abortive conspiracy of Murena in 22 B.C. But as the empire grew stronger and the advantages which it brought became more evident-the repair of the destruction caused by the civil wars, the organisation of government, the development of agriculture and commerce, the establishment at home and abroad of the peace of Rome—his tone passes into real onthusiasm for the

new order.

Horace professed himself a follower of the doctrines of Epicarus, which he took as a reasonable mean between the harshness of Stoicism and the low morality of the Cyrenaïcs. In his Odes, especially those written on public occasions, he uses, as

all public men did, the language of the national religion. But both in religion and in philosophy he remains before all things a man of the world; his satire is more of manners and follics than of vice or implety; and his excellent sense keeps him always to that 'golden mean' in which he sams up the lesson of Epicurus. As a critic he shows the same general good sense, but his criticisms do not profess to be original or to go much heneath the surface. In Greek literature he follows Alexandrian taste; in Latin he represents the tendency of his age to undervalue the earlier efforts of the native genius, and lay great stress on the technical

777

finish of his own day.

From his own lifetime till now Horace has had a popularity unexampled in literature. A hundred generations who have learned him as schoolboys have remembered and returned to him in mature age as to a personal friend. He is one of those rare examples, like Julius Caesar in politics, of genius which ripens late, and leaves the more enduring traces. Up to the age of thirty-five his work is still crude and tentative; afterwards it is characterised by a jewel-finish, an exquisite sense of language which weighs every word accurately and makes every word inevitable and perfect. He was not a profound thinker; his philosophy is that not a profound thinker; his philosophy is that rather of the market-place than of the schools; he does not move among high ideals or subtle emotions. The romantic note which makes Virgil so magical and prophetic a figure at that turning-point of the world's history has no place in Horace; to gain a universal audience he offers nothing more and nothing less than what is universal to mankind. Of the common range of thought and feeling he is perfect and absolute master; and in the graver passages of the Enistles. master; and in the graver passages of the *Epistles*, as in the sad and noble cadence of his most famous *Odes*, the melancholy temper which underlay his quick and bright humour touches the deepest springs of human nature. Of his style the most perfect criticism was given in the next generation by a single phrase, Horatii curiosa felicitus; of no poet can it be more truly said, in the phrase of the Greek dramatist Agathon, that 'skill has an affection for luck, and luck for skill.' His poetry supplies more phrases which have become proverhial than the rest of Latin literature put together. To suggest a parallel in English literature we must unite in thought the excellences of Pope and Gray with the easy wit and cultured grace of Addison.

Horace's historical position in Latin literature is this: on the one hand he carried on and perfected the native Roman growth, satire, from the ruder essays of Lucilius, so as to make Roman life from day to day, in city and country, live anew under his pen; on the other he naturalised the metres and manner of the great Greek lyric poets from Alcans and Sappho downwards. Before Horace Latin lyric poetry is represented almost wholly by the brilliant but technically immature poems of Catullus; after him it ceases to exist. For what he made it he claims, in a studied modesty of phrase hat with a just sense of his own merits, an immortality to rival that of Rome.

EDITIONS: Horace's works are believed to have been EDITIONS: Horace's works are believed to have been printed for the first time in 1470 at Milan. The most important commentaries (with Latin notes) are those of Denis Lambin (1561), Bentley (1711), and Orelli and Batter (1850-52). For ordinary students, with English notes, the most useful editions are by Macleane (1853), Yonge (1867), Wickham (vol. i. Odes and Epodes, 1874), Wilkins (Epistles, 1885) and Palmor (Sattres, 1883). TRANSLATIONS: Francis, Conington (the whole), Sir Theodore Martin (Odes and Sattres), Rutherfurd Clark (Odes). The Life of Horace, by Dean Milman, and Sir T. Martin's book (1870) in the 'Ancient Classics for English Readers' may also be read with advantage. English Readers' may also be read with advantage.

Horatii, the three brothers selected by Tullus Hostilius, king of Rome, to fight against the three brothers Curatii, the champions of Alba Longa, when it was agreed to decide the quarrel between the two cities by the issue of single combat by three warriors chosen from either side. The legend goes that two of the Horatii were speedily slain; the remaining brother, yet unscathed, by a simulated flight, succeeded in engaging each of his wounded opponents singly, and in overcoming them all. As he entered the gate of Rome in triumph, bearing the trophies of the slain, he was met by his sister, whose beloved was one of the dead champions of Alba. She cursed his slayer, her victorious brother, and was by him thereupon stabbed to the heart. Horatius, condemned by the duumriri to be scourged to death, was afterwards saved by the people, and lived to destroy Alba Longa and carry its inhabitants to Rome. This story, although containing a very large admixture of mythical elements, points to the close relationship that existed between Rome and Alba Longa, as well as to the fact of an internecine struggle having taken place before the latter was incorporated in the political organisation of the former.

organisation of the former.

It was a descendant of the survivor of the three Horatii, named Horatius Cocles, who in 507 B.C., along with Titus Herminius and Sputins Lartins, formed the 'dauntless three,' who 'kept the bridge so well in the brave days of old,' against the army of Lats Porsena, king of Latinn, whilst their compatitots broke down the Sublician bridge behind them. Horatins around by swimbridge behind them. Horaius escaped by swinning the 'yellow Tiber,' was received with inbilant shorts by his fellow citizens, and overwhelmed with

honoms and rewards.

Horbury, a village of the West Riding of Yorkshire, 4 miles SW. of Wakefield, manufac-tures woollens, worsteds, flannels, &c. Pop. 5050.

Hörde, a town of Westphalia, 2½ miles SE. of Dartmund, has large ironworks (employing more than 4000 men) and coal mines, with iron, steel, and zine manufactories. Pop. 14,598.

Hordein, a term that has been applied to a

substance that can be extracted from barley (Lat. hordeum), which is merely a mixture of starch, cellilose, and a somewhat nitrogenous matter.

Horeb. See Sinal.

Horehound (Marrubium), a genus of plants of the natural order Labiate, having a tabular 10-ribbed ealyx, with 5 or 10 spiny equal teeth, 4 stamens inclided in the corolla, the upper lip of the corolla erect, the lower lip 3-cleft. The species are mostly perennial, herbaccous plants, natives of the south of Europe and the East. One species, the Common or White Horehound (M. vulgare), is a rather rare native of Britain, and is found generally throughout Europe, except in the more northern regions, growing in waste places, waysides, &c. It is frequently cultivated in gardens among



Common Horehound (Marrubium vulgare).

collections of herbs. It is

whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxa-tive, and is much used in coughs, being a popular remedy, and a very safe and efficacions one. was formerly also employed in affections of the womb and of the liver. It is administered in the form of an infusion, or made into a syrup with sugar, and sometimes the syrup is candied. Horehound is the popular name of Ballota nigra, another native of Britain, and belonging to the same natural order. For Water Horehound, see GYPSY-WORT.

Morizon, the circular line formed by the apparent meeting of the earth and sky; this, in astronomy, is sensible horizon. The rational horizon is the circle formed by a plane passing through the centre of the cuth, parallel to the sensible horizon, and produced to meet the heavens. The artificial horizon is a small trough containing quicksilver, the surface of which affords a rellection of the celestial bodies. It may be used for calculating the altitude of the stars when the sea-horizon is observed by fog or otherwise not available to the sailor determining his position. The dip of the horizon is the angle through which the sea-horizon appears depressed in consequence of the elevation of the spectator. The true dip of the horizon, however, is not exactly the same as its apparent depression. The apparent sea horizon is raised above its true place by refraction through an angle which varies according to the state of the atmosphere and the relative temperatures of the air and water, the variation ranging from one third to onetwenty-third of the amount of the true dip. rule commonly employed is to diminish the true dip by about one-fourteenth of its amount to find the apparent dip.

Hormayr, Joseph, Fremerr von, historian, was born at Innsbruck, 20th January 1782. In 1803 he was appointed keeper of the state and royal archives of Austria, and in 1816 imperial historiographer. But, having conceived an unconquerable hatred of Metternich, who had caused him to be imprisoned for thirteen months upon suspicion of being concorned in a new revolt in Tyrol, Hormayr in 1828 entered the service of Bavaria, and, after four years' activity in the department for foreign affairs, was nominated minister of Bavaria to Hanover from 1832, and to the Hanse towns from 1837. From 1846 to his death on 5th October 1848 he was head of the Bavarian archives. He published several works on the history of Tyrol (including Das Land Tirol, 1845), an 'Austrian Plutareh,' and a general history of modern times.

Horn, a general term applied (I) to certain structures, whatever their composition, growing on the heads of oxen, sheep, girafles, rhinoceroses, &c., and to similar structures on other animals such as beetles; (2) to a substance of a certain definite chemical composition forming 'horns,' hoofs, nails, claws, and other similar structures.

(1) Of horns as they exist among mammals there are two distinct classes: (a) horns formed of cpidermal tissue; and (b) bony horns or antlers. (a)Epidermal horns are of two kinds. The horn of the rhinoceros, which is an example of the first kind, consists of a compact, uniform agalutination of epidermal fibres or bristles. The slightly con-cave base of the horn fits over a slightly-projecting roughened portion of the nasal bones underneath. In the growing horn, while the fibres at the back decay, new libres are so added at the front and sides that, relatively to the fore-part of the head, the position of the horn remains always the same. about 1 to 1½ feet high, bushy, with roundish, ovate, crenate, wrinkled leaves, and almost globose In grown animals new material is added only at

HORN 779

the base, and the whole outer surface is smooth and rounded. The horn is median in position and symmetrical in shape. In the female it is usually shorter and smaller. When a second horn is present it is usually shorter and smaller in size, and is situated behind the first one and on the frontal hones. If we imagine the rough part of the bone underneath and the vascular tissue immediately over it growing upwards into the epidemal born and hollowing it ont, we have the second kind of epidemal horn—the hollow horn found in the Cavicornia (Bovide, Ovide, Anti-lopida). In the case of these horns the bony part, or horn core, is developed as an outgrowth from the frontal bone; in the Bovida and Ovida the cores are hollow or spongy, and their spaces comcores are nollow or spongy, and their spaces com-nunicate with the air-spaces in the frontal hones, while in the Antilopida the cores are solid or only slightly excavated at the base. Hollow horns are usually unbranched and persistent, but in the Prong-horn Antelope (Antilocapra americana) the horny sheaths are shed annually while the bony cores arow and their vascular covering pages. cores grow and their vascular coverings persist and give rise to the new horns; these horns show, after the first year, a small branch or sung analogous to the brow-antler of the deer. In the Chickara (Antilope [Tetracoros] quadricornis), an Indian species of antelope, two pairs of horn cores are developed from the frontal bones. The gigantic extinct antelopes Brannatherian and Sivatherian had two pairs of horns like the Antilope quadricornis, and the hinder pair possessed the branched character now exhibited only by the Prong-horn. Hollow horns are found usually in both sexes, but



Front View of the Skull of the Ox, with the right Horny Sheath dotached from the Core.

in some genera of antelopes (Tragelaphus, Cervieapra, Cephalophus, &c.) only in the male. the Prong-horn the horns of the female are almost hidden in the hair of the head; they are small, short, and unbranched, as in the yearling buck. (b) Bony horns or antiers (see ANTLERS, and DEER) are of two kinds, exemplified by the horns of the deer and graffe respectively. In these the homs are developed from membrane bones which grow up covered by the skin, and nourished by vessels from it. In the giralle they grow just over the junction of the frontal with the parietal bones, and become united to them by means of cartilage. The integrment over the antler is terminated by a tuft of coarser hair, and is persistent. Horns are present in both sexes, and the young giraffe is the only animal born with horns. The antiers of the deer differ from those of the giraffe in that the membrane bones become firmly united by bony growth to the frontal bones, the integument—or velvet—does not persist, and the horns are shed aunually.

(2) True horny tissue is a modified form of cpidermie tissue. The term includes not only true horn, as noted above, but also hoofs, nails, claws, huir, wool, beaks of animals generally, the carapace of tortoises, the scales of the pangolin, the spines of the hedgehog and the quills of the porcupine, the feathers of binds, the 'castors' of borses and other animals, and other epidermic thickenings and growths, whether occurring normally as the callosi-ties over the breasthone of camels and the hips of

some monkeys or pathologically as the 'corns' and 'homs' of the human subject. This tissue largely consists of an albuminoid substance termed 'keratin,' which is composed of carbon (from 50.3 to 52.5 per cent.), hydrogen (from 6.4 to 7 per cent.), nitrogen (from 20.7 to 25 per cent.), nitrogen (from 16.2 to 17.7 per cent.), and sulphur (from 7 to 5 per cent.). Keratin may be obtained from the stinetimes above enumerated by the successive action of boiling water, Cellular Structure alcohol, ether, and dilute acids,



of Horn.

and is probably a compound body that has not yet been resolved into its com-Viewed under the microscope, horny ponents. tissue is seen to consist of numerous parallel bundles of fine threads. These threads, under the action of a concentrated solution of caustic potash or soda, unfold into small plates which gradually expand into regular nucleafed epidermic cells shown in the

Cattle are frequently dishorned to prevent them from constantly going and injuring each other when confined in open courts; the whole or part only of the hom and hom core may be removed, but the usual method is total dishorming by sawing off the horns close to the head, at their junction with the skull. If the operation is skilfully performed, and if proper precautions be taken to prevent in-flammation following, the operation is affirmed by many to be by no means a very painful one (much less so than many others, such as branding), the skin being the most sensitive structure involved. It should not therefore, it is argued, be considered within the category of cruelty to animals forbidden by law. In 1889, however, the Queen's Bench division decided against this view, the judges denouncing the practice as cruel and demoralis-ing. The Scattish Court of Session in 1890 came to an opposite conclusion, which was appealed from.

HORN MANUFACTURES .- The horns of the ox, buffulo, sheep, goat, and antelope are hollow, tough, and capable of being split into flexible slices. Rhinoceros horn, though solid through nearly its whole length, resembles that of the ox in its nature. From the most remote ages the horns of animals have been employed by man for various purposes. Numerons examples of poniards, handles, pick-axes, dart-heads, 'batons of authority,' and implements of unknown use made of reindeer and reddeer horns have been found in river-gravels among other prehistoric remains of the Neolithic period. But the most remarkable of the productions of Neolithic man which have yet been found are pieces of reindeer horn and mammoth tusks with carvings or etchings of animals upon them.

Horns of the ox, as well as those of the sheep and goat, can be split up into sheets or plates after they have been soaked and boiled. When made very thin such plates were at one time used for windowpanes, for the construction of lanterns, and for covering Hornbooks (q.v.). Two pieces of horn can also be welded together at the edges by steepand them in hot water and applying pressure. Another valuable property of horn is that when heated it can be pressed into a die or mould. In this way it is formed into ornamental handles for knives, forks, unbrellas, and walking-canes; also into drawer-knobs, spoons, boxes, buttons, and many other useful articles. The manufacture of combs from horn is already described under Comb.

HORN 780

It may be stated here that the hoofs of oxen are likewise manufactured on a large scale into combs, and to some extent into other articles such as

In their natural form, but cleaned and polished, horns are used as drinking-cups and snuff-hoxes, and in past times they were very largely employed for holding gunpowder. They also served as wind-instruments. Many of the Scotch powder-horns in use during the 16th and 17th centuries are beantifully and elaborately carved. A considerable mmber of these are illustrated in Drammond's Ancient Scottish Weapons (1881). In India buffalo and other horns are used for ornamental work of various Rhinoceros horn again is a favourite material with Chinese carvers, who form the base of it into elegant cups, and sometimes make a very effective ornament of the entire horn, which admits of being very buildly carved. The deer horn so much worked up at Shellield into handles for carving and pocket knives is chiefly that of the Axis deer (Cervus axis) of India. Deer horns are employed in France and Germany to decorate furniture. In Great Britain the antiers or horns of the stag, the roe, and the fallow deer—generally with the skull attached—are favourite ornaments for the decora-

are now somewhat costly. The average annual imports of horns and houfs into Great Britain for the three years ending 1888 amounted to 5000 tons, valued at rather more than £150,000. To show the large size to which some horns attain, it may be stated that a pair on the head of a Cape ox sometimes measures 9 or 10 feet from tip to tip. The horns of a large-sized Indian buffalo, though curved in shape, are about as long. They are 8 or 9 inches broad at the base, and a single horn may weigh 11 or 12 lb.

tion of entrance halls, and good examples of these

Horn, Cape, commonly spoken of as the southermost point of America, is a steep, black, bare mountain-headland of one of the small islands of the Fuegian Archipelago, 55° 59' S. lat., 67° 14' W. long. It was named Hoorn, anglicised Horn, 'the Horn,' when rounded in 1616 by the Dutch navigators, Lemaire and Schonten. It was sighted by Drake in 1578. The dangerous doubling of Cape Horn is availed by steamers, which now pass through the Strait of Magellan.

Horn, Count (1518-68). HOLLAND (History). See EGMONT, and

Horn, FRENCH (Fr. cor, cor de chasse; Ital. corno, corno de caccia; Ger. horn, waldhorn), one of the most important, as it is the softest toned, of brass instruments used in orchestral music. Its soft and peculiar tone is due to the length of the tube, the shape of the bell, and the funnel-like bore of the mouthpiece. This latter important bore of the mouthpiece,

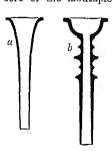


Fig. 1.

point will be understood from fig. 1, which shows a section of the harn monthpiece (a) contrasted with that of the trampet (b), the most brazen of brass instruments. The original French horn was used in lmuting, and consisted of a long tube with two or three turns made large enough to go over the shoulders of the hunter. It was used from a very early period, but it was Louis XV. who composed

the complete set of sounds and fanfares still used in the French hunting-field.

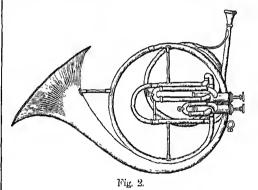
It was introduced into the orchestra in the early part of the 18th century, and it gradually acquired horn (q.v.) is a different instrument.

the important position it now holds from the smooth softness of its tones as a foundation for harmony in chords, and its fine contrast with other instruments.

For orelicstral purposes the instrument was improved by the addition of crooks of varying lengths, so as to pitch it in different keys; and thus horn nunsic is always written in C with the key added to show the crook to be used. These erooks are usually eight in number, and extend from Ah in alto to C basso; the lowest crook making the total length of the instrument a little over 16 feet. There are also tuning crooks, raising or lowering either of the others a semitone, and also a tuning slide for the more accurate timing with the other instruments. The open notes of the horn are the harmonics of its fundamental note (see HARMONICS), and as this, from the length of the tube, is very low, the harmonics in the middle scale are at very short intervals with many consecutive notes. It may be given approximately



The notes actually sounded, of course, depend on the crooks used. The method of forming the interanediate notes by hand-stopping was discovered by a player named Hampl at Dresden about 1770. The open hand, with the fingers close together, is introduced into the bell, lowering the pitch a semi-tone. These stopped notes, however, have a minfiled sound, and in modern times the horn is almost always made with two or three valves to bridge over the intervals. Fig. 2 shows the horn



with two valves as commonly used. On account of the frequent changes of pitch, and the number and tenderness of its open notes, it is a dillicult instru-ment to play. The horn is very seldom used singly; either two or four being the usual number in the orchestra.

Handel, Mozart, Beethaven, Schubert, Weber, Mendelssohn, Rossini, Schumann, and all composers of note have given the horns a most important place in their works. See article 'Horn' in Grove's Dictionary of Music.

POSTHORN, a straight brass or copper instru-ment, varying from 2 to 4 feet in length, and somewhat resembling the bugle in its taper bore; it has a small cupped morthpiece. It was used as a signal instrument by the guards of mail-coaches, but has occasionally been introduced into light music. It has the same open notes as the Bugle (q.v.). The hunting-horn, used in England, is a shorter instrument of the same kind. The SaxHornbeam (Curpinus), a genus of the natural order Amentacew, consisting of trees with compact, tough, hard wood; bark almost smooth and of a whitish-gray colour, decidnous leaves, and monecious flowers. The male catkins are cylindrical and sessile; their flowers consist merely of a little scale-like bract and twelve to twenty-four stamens. The female catkins are slender, several inches long when in fruit, and conspicuous for their long leaf-like bracts, and containing small, ovoid, prominently



Common Hornbeam (Carpinus betulus): a, male catkin; b, femule catkin, fully developed; c, fruit.

ribbed nuts. The flowers appear in spring as the leaves come out. Such are the characteristics of the Common Hambeau (Carphina betalus), which is believed to be indigenous to Britain, but is hest known as a plantation tree. It has a wide range of distribution on the continent of Europe.

known as a plantation tree. It has a wide range of distribution on the continent of Europe.

The tree attains a height of from 30 to 80 feet—rarely the latter. The wood is white, very compact, hard, and tough, but does not now rank high commercially. It is occasionally used by joiners, turners, and wheelwrights, but, being capable of receiving a fine pulish, is more in demand for purposes of ornament than utility. It was formerly in Britain, and is yet in many parts of Europe, preferred for making yokes for eattle—hence, according to some authorities, the name hornbeam. It is one of the beech, being persistent in winter, it is employed as a hedge plant for purposes of shelter. There are a very few other species of Carpinus natives of Europe, Asia, and North America, differing chiefly in the size and shape of the fruiting bracts.

Hornbill, the name of a genus (Bueeros) and of a family (Bucerotide) of birds now placed in the division of Fissirostral Picarian birds. The species are numerous, and are found in Africa, India, and throughout the Malayan region as far as New Guinea. They are mostly large birds, the largest being more than 4 feet long, the smallest rather smaller than a mappie. They are bulky birds of heavy, noisy flight; their large bills are surmounted by bony crests or helmets of varied shape and sometimes of great size, but rendered light by the presence of numerons air-cells. Their food is principally fruits, but in certain circumstances they become to a great extent ounivorous. The most curious fact regarding these birds is that during the breeding season the male imprisons the female in the nest in a hollow tree, plastering up the entrance, and leaving only a small slit through

which he supplies her and her off-pring with food until the young ones are nearly full grown. In

captivity the male bird has been observed to disgorge at intervals the lining of his gizzerd in the form of a bag, and it is supposed that the fond supplied to the female during her term of captivity in the breeding season is enclosed in this structure.

Hornblende. an important rockforming mineral. having much the same composition as angite. It is considered to be an iso morphous mixture af silicate of magnesia and lime and silicate of iron and line, combined with an aluminous silicate of lime and magnesia.



Hornbill (Buceros rhinoceros).

In the and magnessa.

It crystallises in monoclinic forms; has a hardness = 5.5 to 6; and specific gravity = 3.1 to 3.3. There are two tolerably well-marked varieties—viz. common hornblende and basaltic hornblende. Common hornblende is dark-green to raven-black, and is characteristic of many crystalline schists and phttonic rocks. It generally takes the form of long prismatic crystals, but is sometimes massive, fibrans, and radiating. Basaltic hornblende is generally brownish-black to pitch-black, and the crystals are usually short and well formed. It occurs as a primary constituent of many eruptive rocks. Smaragdite is a peculiar grass-green lamellar form of hornblende, characteristic of the rock Eclogite.

Hornbook, the primer or apparatus for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black letter or in Roman, with perhaps a small regiment of monosyllables. Then followed a form of exorcism and the Lord's Prayer, and as a finale, the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front—bence the name of horn-book. There was a handle to hold it by, and usually this handle had a hole for a string, whereby the apparatus was sling to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn. At first the leaf was of vellum, with the characters in writing; latterly, of paper, and printed. The horn-book was prefaced and otherwise ornamented with figures of the cross, and hence came to be often called Christ Cross Row, or Criss Cross Row. Common as hornbooks at one time were, copies of them are now exceedingly rare. In Notices of Engitive Tracts, printed for the Percy Society (1849), Mr Halliwell figures a very perfect specimen, which he assigns to the time of Elizabeth. Allusions to the hornbook abound in the older writers; thus Shenstone, in his Schoolmistress, tells us of the children, how

Their books of stature small they take in hand, Which with pellucid horn secured are, To save from fingers wet the letters fair.

Horncastle, an ancient market-town of Lincolnshire, at the foot of the Wolds, between the confinent Bain and Waring, 21 miles E. of Lincoln,

with which it is connected by a branch-line (1855). It has a handsome Perpendienlar church (restored 1861), a corn exchange (1856), a grammar-school (1562), and a great August horse-fair, to which Borrow devotes eleven chapters of the Romany Rye. Roman remains have been found here, and in the neighbourhood are Serivelsby, long the seat of the Dymokes, champions of England; Winceby, the seene of a Royalist defeat (1643); Woodhall Spa. with a salt-spring discovered in 1820; and the site of the Cistercian abley of Revesby (1142). Pop. (1841) 4921; (1881) 4818. See Weir's History of Horncastle (1820).

Horne, RICHARD HENRY 'HENGIST,' a bright and vigorous writer, born on New-year's Day 1803. He was educated at Sandhurst, but from love of adventure found his way into the Mexican naval service, and took his share in all the fighting that was going at Vera Cruz, San Juan Ulloa, and else-where. After passing through perils of all kinds, from yellow fever, sharks, broken ribs, shipwreek, mutiny, and fire, he reached England in safety, and plunged into a busy life of letters, writing poetry and prose alternately and with equal excel-His famous epie Orion he published at the price of one farthing in 1843, to show his contempt for a public that would not buy poetry. In 1852 he went to Australia to dig for gold, and quickly became a person of consequence in the colony of Victoria; but he returned to England in 1869, dissatisfied with the government's failure to implement its obligations. He maintained the same incessant activity almost up to the close of life, his iron constitution braced by the swimming and athletic feats in which since boyhood he had been authence leads in which since hospitod he had been foremost. He died 13th March 1884. Among his books may be named Exposition of the Fulse Medium and Barriers excluding Men of Genius from the Public (1833), A New Spirit of the Age (1844), in which he was helped by E. B. Browning; and Australian Facts and Prospects (1859); two tragedies, Cosmo de Medici (1837) and The Death of Marlowe (1837); Judas Iscariot: a Miracle Play (1848); and The Dreamer and the Worker (1851). Mrs Browning's letters to him were collected in

Horne, Thomas Hartwell, biblical critic, born October 20, 1780, was educated at Christ's Hospital, and afterwards became clerk to a barrister. His leisure hours were devoted to the study of the Bible, and in 1818 he published his Introduc-tion to the Critical Study and Knowledge of the Holy Scriptures, a work which procured for him admission into orders without the usual preliminaries. Subsequently, St John's College, Cambridge, granted him the degree of B.D., and the University of Pennsylvania that of D.D. In 1833 he obtained a rectory in London; and he was also made a prebendary of St Paul's Cathedral. In the course of a long life Horne published a large number of theological works, and died 27th June 1860. The Introduction became a very popular anthority and passed through many editions: an important one was that edited in 1856 by Dr Samuel Davidson (q.v.). See the Reminiscences of T. H. Horne, by his dangliter (1862).

Horned Screamer. See SCREAMER.

Horned Toad, also called Horned Frog and Horned Lizard (*Phymosoma cornutum*), is really a lizard belonging to the Agamidae (q.v.). It is found in Mexico, Texas, Oregon, and California.

Horned Viper. See CERASTES.

Hornellsville, a town of New York, 91 miles SE. of Buffalo by rail, with railway workshops, and manufactures of moving-machines, shoes, &c. Pop. 8195.

Horner, Francis, was born at Edinburgh. 12th August 1778, a merchant's son of mixed English and Scottish ancestry. From the High School he passed at fourteen to the university, and, after three years there, spent two more with a elergyman in Middlesex, there to 'unlearn' his broad native dialect. On his return (1797) he was called to the Scottish bar, from which in 1802 he removed to the English; and in 1806 entered parliament as Whig member for St Ives. He had made his mark in the House as a political economist, when, at the early age of thirty-eight, he died of consumption at Pisa, 8th February 1817. There is but himself be left little to preserve his name, beyond some contributions to the Edinburgh Review (q.v.), of which he was one of the founders. Yet, in Lord Cockburn's words, he was 'possessed of greater public influence than any other private man, and admired, beloved, trusted, and deplored by all except the heartless or the base.' And this, ny an except the heathless of the base.' And this, he explains, was due, not to rank, wealth, office, talents, eloquence, or fascination of manner, but merely to 'sense, industry, good principles, and a good heart—to force of character.' See Horner's Memoir and Correspondence (2 vols. 1843), and Cockburn's Memorials of his Time (1856).

Hornet (*Vespue crabro*), the largest species of asp found in Britain. It is not uncommon in wasp found in Britain. It is not uncommon in some parts of England, but is not found in Scot-

It measures land. about an inch in length, and is predominantly brown or brownish-red, with some yellow on head, abdomen, and wings. The insects lick the sap of trees and are very partial to sweet things, such as fruit. the secretion at aphides, &c. Αí times, however, they are markedly ear-The fenivorous. forliave males midable retractile The nest, stings.



Hornet (Vespa crabro).

which is built in a hollow tree, in an outhouse, or in some other sheltered place, is composed of a coarse papery material manufactured from bark. The community of males, females, and workers is not supposed ever to include more than about 200 individuals, all of them the offspring of a single female, which, having survived the winter in some sheltered hiding place, laid the foundation of her nest in spring. The hornet is common throughout Europe, and is represented in the United States by the Whitefaced Hornet (V. nucculata), also a large species. See WASP.

Horning, in Scots law. See Execution. Hornpipe is the name of an English dance,

probably named after an obsolete musical instru-ment. Many popular hornpipes are familiar, such as the College hornpipe, &c. Those best known are in commen time, although the earlier ones were in 3 time. See Chappell's Popular Music.

Hornstone, an impure variety of flint, with a

very splintery fracture.

Horn-work, in Fortilication, is a capacious form of advanced work formerly much used. The head is a bastioned front, and therefore self-flanking, while the sides or branches are flanked from the works in rear. If, instead of a single bastioned front, the work has two bastioned fronts, it is called a Crown-work (q.v.), and if three, a double crownwork. The position of these works is outside the glacis. There were good examples in the old fortifications of Strasburg. See also FORTIFICATION.

Horodenka, a town of Austria in East Galicia, 106 miles SE. of Lemberg. Pop. 10,226.

Horology (Lat. horologium, Gr. hörologion, 'a sun-dial,' 'a water-clock;' Gr. höra, 'a scason,' 'an hour, and -logion, from legein, 'to tell;' compare Old Eng. horologe, Fr. horloge, 'a clock'), the science which treats of the construction of machines for telling the time. Although it is easy to loal back to a period when time, according to the modern concoption of it, as measured by hours and minutes and seconds, was unknown, yet we find progress carly made in the measurement of larger periods of time, by observations of the heavenly bodies. Thus, time was early divided into years according to the apparent motion of the sun among the constellations; into months by the revolution of the moon round the earth; and into days by the alternate light and darkness caused by the rising and setting of the sun. It was long, however, before any accurate measure was found for a division of the day itself. The earliest measure employed for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sun-dials (see DLAL). Another means early adopted for the measurement of short periods of time was by noting the quantity of water discharged through a small orifice in the containing vessel, Instruments for the measurement of time on this principle were called Clepsydre (q.v.). The running of fine sand from one vessel into another was found to afford a still more certain measure, and hence the invention of the Hour-glass (q.v.). King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle.

It is not very easy to trace to its source the history of the invention to which the unodern clock owes its parentage, as there are many vague allusions to horologes from a very early period; but whether these were some form of water-clock or wheel-and-weight clock is uncertain. But there seems little reason to doubt that Gerbert, a distinguished Benedictino monk (afterwards Pope Sylvester II.), mado a clock for Magdeburg in 996, which had a weight for motive power; and that weight-clocks began to be used in the monasteries of Europe in the 11th century; though it is probable that these only struck a bell at certain intervals as a call to prayers, and had no dial to show the time. St Paul's Cathedral had a 'clock-keeper' in 1286, and presumably a clock; and Westminster possessed one about 1290, and Canterbury Cathedral about 1292. An entry in the patent rolls of the eleventh year of Edward II. (1318) proves that Exetor Cathedral had a clock in that year, and St Albans, Glastonbury, Padna, Strasburg, and many other places possessed them in the first half of the 14th eentury. The St Albans clock was a famous astronomical one made by Richard de Wallingford, who was son of a blacksmith of St Albans, and afterwards became abbot there (1326-34). The clock made for Glastonbury Abboy by Peter Lightfoot, a resident monk (about 1325), was removed in the reign of Henry VIII. to Wells Cathedral, and is now preserved in South Kensington Museum; as is also an old clock from Dover Castle, bearing the date 1348, and the initials R.L. in monogram. The original great clock at Strasburg Cathedral was made in the years 1352-70 (remodellod and reconstructed in 1571-74). A clock much superior to anything preceding it was that made by Henry de Vick (or Wick) for the tower of

Charles V.'s palace at Paris in 1370-79. It was said to be on the hell of this clock that the signal was given for the massacre of St Bartholomew, 1572. By successive improvements clocks have gradually developed into the beautiful pieces of mechanism of the present day. Many emions and interesting specimens, such as that of Strasburg (q.v.) (1594), Lyons Cathedral (1598), St Dunstan's, London (1671; removed to a house in Regent's Park, 1831), and many others, have an historical interest. Many emiosities of mechanism are still constructed in the name of clocks, but generally eccentricity is their only feature. Those interested in the subject will find much information in Wood's Cariosities of Clocks and Watches (1866). The date when portable clocks were first made cannot be determined. They are mentioned in

The date when partable clocks were first made cannot be determined. They are mentioned in the beginning of the 14th century. The motive power must have been a mainspring instead of a weight. The Society of Antiquaries of England possesses one with the inscription in Bohemian that it was made at Prague by Jacob Zech in 1525. It has a spring as motive power with fusee, and is one of the oldest portable clocks in a perfect state in England.

Illuminated clock dials, to shine at night, were introduced in the first quarter of the 19th century.

Clocks are of many and various kinds—striking and non-striking—turret clocks hig enough to carry hands 6 to 10 feet long and to ing a bell to be heard at 20 miles' distance, the good old-fashioned eight-day clock with its long case, the ornamental drawing-room spring clocks, Dutch clocks, American clocks, and an infinity of others. Technically, those which strike are called clocks, and those which do not strike, timepieces, irrespective of size. But, however much they may vary in size and appearance, they are all founded on

the same principle, and it will answer our present purpose to illustrate that principle in its more ordinary form of the household clock.

Fig. 1 represents a diagram of a non-striking timepiece. A weight, by turning a barrel, a, on which its cord is wound, sets in motion a train of wheels, b, c, terminating in the erown-wheel or escapement-wheel, d. These wheels are set between two plates which are fixed together by four pillars, one at each corner; the pillars are riveted into the back plate, k, and fastened with movable pius into the front plate, k'. The dial, removed in the fig., is also rived on to the fact, what piuned on to the front plate by four short pillars or feet. The teeth in the pinions and wheels are so arranged in number that, while the crown-whicel revolves in 60 seconds, the centre wheel, b, takes an hour to do so. To takes an honr to do so. regulate the speed at which the clock shall move, an arrangement called an escapement, c (to be afterwards more fully described), communicates by means of its crutch (at f) with the pendulum, g, which is suspended by a spring from the cock at h. The arbor of the barrel

extends in a square form to the dial at i, where



it is wound up; a ratchet preventing its unwinding without turning the wheel with it. The hands have a separate train of wheels, called the dial or notion train, between the front plate and the The arbor of the centre wheel, b, is produced to the dial, and on it is put the minutewheel, revolving once an hour, with a long socket on which the minute-hand is fixed. Over this is placed a larger wheel, the hour-wheel, I, revolving in twelve homs, which is set in motion by the pinion of a duplicate minute-wheel, m (and also seen at h, fig. 6). The attachment of the minute-wheel to the centre-wheel arbor is, by means of a spring, enough to ensure the hands heing carried round with the clock, but not enough to prevent the hands being turned, when necessary, by band, without disturbing the interior works.
Striking clocks have an additional train of

wheels with separate weight (or spring) for the striking; it will be described further on.

Spring-clocks—i.e. clocks having a coiled spring as a motive power instead of a falling weight—have an arrangement of barrel and fusee chain similar to that of the watch, to be afterwards described. The spring is used when it is wished to sare space, as the necessary fall of a weight requires a case deep enough to hold it, something about 4 feet for an eight-day clock. Their size also necessitates a short pendulum, which, of course, does not indicate seconds.

Previous to the invention of the pendulum, the regulating apparatus was generally as shown in fig. 2, which represents part of De Viek's clock

· CIL 1111

already mentioned. The teeth of the escapement-wheel, I, acting on the two pallets, h, i, attached to the upright spindle or arbor, KM, to which is fixed the balance, LL, gave to the latter an alternate vibrating motion, or which was which was regulated by two small weights,

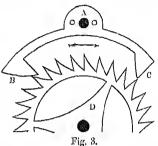
these weights were moved from the centre, the more they retarded the movement; and, by means of numerous notches, their position could be shifted till the proper speed was secured.

The great epoch in the history of horology was The great epoch in the history of horology was the introduction of the Pendulum (q.v.) as a regulating power. This has generally been attributed to Huygens, a Dutch philosopher, who was undoubtedly the first to bring it into practical use (1657). The fact of the actual invention, however, is obscure, and Sir E. Beckett says: 'The first cardshave black the first tenth of the second of the says.' pendulum clock was made for St Paul's church, in Covent Garden, by Harris, a London clock-maker, in 1621, thengh the evedit of the invention was claimed also by Huygens himself, and by Galileo's son, and Avicenna, and the celebrated Dr Hooke. In adapting the pendulum to the clocks previously existing Huygens had only to add a new wheel and pinion to the movement, to enable him to place the crown-wheel and spindle in a borizontal instead of a perpendicular position, so that the balance, instead of being horizontal as in De Vick's clock, should be perpendicular and extended downwards, forming a pendulum at one end.
The principle of construction adopted by Hnygens,

from the peenliar action of the levers and spindle, required a light pendulum and great arcs of oscilla-tion; and it was consequently said that 'Hnygens's clock governed the pendulum, whereas the pendulum ought to govern the clock.' About ten years afterwards the celebrated Dr Hooke invented

an escapement which enamed a test meaning power to impel a heavier pendulum. The pendulum, too, making smaller area of vibration, was less resisted by the air, and therefore performed its with greater regularity. This device is an escapement which enabled a less maintaining It was brought called the unchor escapement. by Hooke before the notice of the Royal Society in 1666; and was practically introduced into the art of clock-making by Clement, a Loudon clock-maker, in 1680. It is the escapement still most usually employed in ordinary English clocks. Fig. 3 form of the represents the more modern

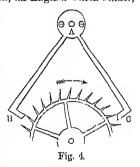
anchor or recoil cseapement : its axis; BC, the pallets; and D, the escapementwheel revolving in the direction of the arrow. The eonnection between the pendulum and escapement may be seen in fig. 1. When the pendulum



swings to the right AC rises, and a touth escapes swings to the right AC rases, and a touth escapes from C, while another falls on the ontside of B, and, owing to the form of the pallet B, the train goes back during the remainder of the swing. The same thing occurs on the pendulum's return; the ann AB rises, a tooth escapes from B, and another falls on the inside of C and backs the wheelwork as before. As each of the thirty facts of the wheel the goes twice on the pallets teeth of the wheel thus acts twice on the pallets, at B and again at C, it follows that a hand fixed on its arior will move forward with of a circle with each vibration of the pendulum and mark seconds on the dial. At each contact the onward pressure of the wheel gives an impulse to the regulation of the wheel gives an impulse to the regulation of the seconds. pressure of the wheel gives the impaise to the pendulum, communicated through the crutch, sufficient to counteract the retarding effects of the resistance of the air and friction, which would otherwise bring it to a standstill. The length of a pendulum oscillating seconds is, for the latitude of London, about 39'14 inches.

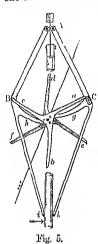
The defect of Hooke's escapement is the recoil, and various modifications have been devised to obviate this. The first and most successful was made by George Graham, an English watch-maker, in the beginning of

the 18th century, and his improved form is called the dead-beat escapement (fig. There the onter surface of B and inner surface of C are ares of circles whose centre is A, and a little consideration will show that there can be no reis adopted in timekeepers when greacentacy is required. great



Many other escapements for clocks have been devised; but no one seems to have met with general favour except a certain form of remontoire or gravity escapement. The form of it shown in fig. 5 is called the double three-legged escapement, and was invented for the great clock at West-minster, in 1854, by E. B. Denison (afterwards Sir E. Beckett, Q.C.). In this clock the pendulum is 13 feet ½ inch long, to vibrate in two seconds, and its bob weighs 6 cwt. The escapement consists of two gravity impulse pallets, AB and AC,

moving on pivots at A. The escape-wheel consists of two three-legged wheels, abe and def, squared on one arbor a little distance apart, with three lifting



pins (or three-leaved pinion) fixed between them. The three pins are shown by the three dots in the centre of the lig. The legs of the wheels are generally arranged alternately as in the fig. The pallets, with their arms g and h, lie between the wheels; at C is a block to lock the legs abe, and at B, on the other side, and of course acting in the reverse direction, is another to lock the legs def. The leg a is, in the fig., locked on the block at C. The pendulum, part of which is removed to show the escapewheel, is supposed to be moving in the direction of the arrow, and has received impulse from the falling pallet AB at i; it is just beginning to touch the other pallet at k,

which has been kept in position clear of the pendulum by one of the centre pins bearing on the arm g. The pendulum before turning again moves the pallet AC just enough to allow the leg a to escape from the locking-block at C; the wheel flies round, impelled by the clock-weight, till the leg f locks on the block at B; by the same movement the pin which is seen near the end of the arm f pushes the pullet AB away from the the arm h pushes the pallet AB away from the pendulum, which now gets impulse from the fall of the pallet AC. This goes on at each side alternately, the pallets being raised by the clock train, the pendulum only unlocking them. To make the motion go smoothly and prevent jar, a fly is attached to the arbor of the escape-wheel by a spring; it is seen in the figure. As the height to which the pallets are lifted is the same, however unequal the force communicated by the train may be, the are of vibration of the pendulum remains constant, as the weight of the arm and the distance it falls are always the same.

The gradual perfection of the clock required also improvements in the regulating power which the arm h pushes the pallet AB away from the

also improvements in the regulating power which finally resulted in the compensation pendulum (see

The improvements in the escapement and the pendulum bring the mechanical perfection of the clack, as a time-keeping instrument, to the point clock, as a time-keeping instrument, to the point which it has attained at the present day. But the art of horology would be incomplete unless there were some standard, independent of individual mechanical contrivances, by which the errors of each may be corrected. This standard is supplied by observatories, and the methods by which time is determined belong to the details of practical astronomy. There are in most parts of the United Kingdom now sufficient opportunities of setting clocks by a communication more or less of setting clocks by a communication more or less direct with these establishments. When these are not to be had the sun-dial may still be used with advantage as a means of approximation to the correct time. The time which a clock ought to mark is mean time, the definition of which will be found in the articles DAY and TIME. The mean time at any place depends on the longitude. Sup-posing a clock to be set to Greenwich mean time, a clock keeping mean time of any place will be 4 minutes faster for every degree of longitude east of Greenwich, and 4 minutes slower for every degree west. Since the introduction of railways, clocks are usually set within Great Britain to Greenwich

In the United States, where the extent of country makes it unadvisable to use the mean time of one meridian, four standard meridians were adopted in 1883—viz. 75°, 90°, 105°, 120° west of Greenwich. Clocks showing 'Eastern,' 'Central,' 'Mountain,' and 'Pacific' time are therefore respectively five, six, seven, or eight hours slower than Greenwich mean time.

For the more ready transmission of correct time to the public there is at Greenwich Obserdropped by means of electricity precisely at one o'clock. Several attempts have been made to keep the public clocks of a town in perfect agree-ment with the mean-time clock in the observatory. One means of effecting this was by an electric connection and a modification of Bain's electric pendulum (1840), by Mr R. L. Jones of Chester (1857), on the suggestion of Mr Hartnup, the astronomer of the Liverpool Observatory. For a description, see ELECTRIC CLOCK. A clock in the castle of Edinburgh, by whose mechanism a gun is fixed precisely at one c'clock avery day is confired precisely at one o'clock every day, is controlled by the mean-time clock in the observatory on the Calton Hill.

It is not known when the alarum or when the triking-mechanism of the clock was first applied. The first striking-clock probably announced the hour by a single blow, as they still do in churches to avoid noise. During the 17th century there existed a great taste for striking-clocks, and hence a great variety of them. Several of Tompion's died 1713) clocks not only struck the quarters on

eight bells, but also the hour after each quarter.
The striking part of a clock (see fig. 6, which shows an English striking-clock by Ellicott, taken

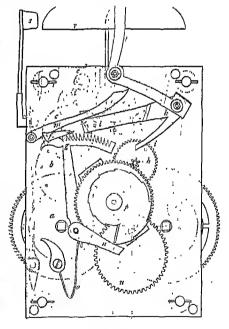


Fig. 6.

from the engraving in Moinet's work) is a peculiar and intricate piece of mechanism. The motive power is a weight used in a similar manner to that in the time keeping train shown in fig. 1. In fig. 6, a, b, c, d, c are the striking-train; c is a fly which acts as a drag to prevent the striking being too rapid. The striking-train is kept in a normal condition of rest by the tumbler or gathering pallet

fixed to the prolonged arbor of the wheel c, being caught by the pin at the end of the rack g. A few minutes before the hour, a pin on the wheel, h, of the dial-train, raises the arm, i, of the lifter i, k, l, which in turn lifts the lever m, which has by means of its hook been holding the rack, q, fixed. The tail end, n, of the rack is then forced by the spring, o, against the 'snail' p. The snail is attached to the honr-wheel of the dial-train (see fig. 1), and consequently revolves in twelve hours, and has a step for every hour. The rack, in falling on it, is freed to the extent of a tooth (i.e. a tooth gets past the hook at m) for every step of the snail. As shown in the fig., one tooth would be freed, and the result would be that the clock would strike one; when the last step of the snail is reached, twelve would be struck. The result of this movement is that be struck. The result of this movement is that the striking-train moves a little till a pin on the wheel ℓ catches on the end of the lifter ℓ , which is tunned down through a hole in the plate for the purpose. The resulting sound is called 'warning.' Precisely at the hour the pin on the wheel ℓ slips past the end, ℓ , of the lifter, which falls, relieving the striking-train; the hours are struck on the bell r, by the hammer s, acted on by the pius on the wheel ℓ . As the tundler attached to the wheel ℓ revolves once for every attached to the wheel c revolves once for every stroke of the bell, it gathers up a notch of the rack at each revolution, until it is stopped by a return to its original position of rest at the pin on the rack g. The rack, lever, and lifting-piece are above the front plate, and are pivoted on studs fixed into it. A lever, t, moved by a pointer on the dial, throws the striking work out of gear when the clock is required to be silent. In the fig. u is an extra whice for driving a hand to show the days of the month.

Clocks which chine the quarters and half-hours have generally a third train of wheels for the

chiming.
In England clocks are principally made in London and Handsworth near Dirmingham, though there are many small local makers. Many of the ornamental clocks and timepieces are manufactured in France.

Dutch or wooden clocks were lirst introduced about the middle of the 17th century. about the middle of the 17th century. Though made on the same principle as ordinary clocks, their arrangements are much simplified, and their principal parts made of wood and wire, only the actual wheels being brass. They are very cheap, and consequently became very common in lower-class households and kitchens. They are made in the Black Forest in Germany, and, considering their mode of manufacture, are wonderfully accur-

ate as timckcepers when properly taken care of.
They are now rapidly being superseded by
American clocks, which, on account of their cheap-

popular. Their manufacture is a great industry in the United States, at Waterbury in Councetient, Brooklyn, New York, and many other places. The wheels and plates are stamped, and very little manual labour is spent on them, every part being interchangeable in similar-sized clocks. Their appearance is too familiar to require a detailed description. To many of these cheap

clocks alarmus are litted, which can be set to sound at any hour. See ALARM.

Watches.—The modern perfect watch and chronometer may be said to be the result of a gradual development from the early clock rather than that of any particular invention. The first step that of any particular invention. The first step was obviously to find some other form of power than the weight; and this was made in the end of the 15th century by the invention of the coiled

spring as a motive power, but where, or by whom. is uncertain.

It seems to be taken for granted that Peter Hele, a mechanician of Nnremberg, as early as 1490 made small pocket clocks of steel which showed and struck the hours, and were driven by a coiled spring. These from their oval shape were called Nnremberg eggs. The next step was the invention of the fusee, an arrangement to overcome the weakening of the spring as it became uncoiled. This also is involved in obscurity, though it must have occurred early in the 16th century, as the clock mentioned as made by Jacob Zech in 1525 has that modification. At first a gut cord was used, the chain being a modern invention. The balance used was exactly like that of De Vick's clock (fig. 2), except that the weights on the arms of it were fixed instead of hanging. The next step of any consequence was the invention of the balancespring by Dr Hooke in 1658-60, which was the foundation of all the varied improvements resulting in the almost perfect chronometer compensation. balance of the present day.

Although watches were introduced into England in Henry VIII.'s time, they did not come into general use till the reign of Elizabeth, and then their cost confined them to the wealthy. At first they were very large, on account of their striking part; and their cases, without glass, were pierced with elaborate open work to let out the sound of the bell. When the striking work was dispensed with, they of course became much smaller, and graduwith they of course became interstance, and gradually drifted into being ornamental rather than useful. They were richly ornamented with pictures in enamel, set in the heads of walking-sticks, in bracelets, in finger-rings, and enriched with the most costly jewels. They were encased in crystal and in imitation skulls, and in fact became subject to all the vicissitudes of fushion, through which it

would be needless for us to follow them. The curious will find much entertaining matter in Wood's work already referred to. Previous to the invention of the balance-spring, watches (as also clocks) had only one hand, which showed the hours; but after that event the greater power of regulating the motion led to the introduction of extra wheels to carry minnte, and finally seconds, hands.

The watch is essentially a miniature edition of

the ordinary spring-clock, except in two pointsviz. that it has a balance spring instead of a short pendulum, and that, as the escapcment-wheel revolves in about six seconds, an extra wheel revolving in a minute is introduced to carry the seconds hand.

The train of an ordinary verge watch is shown in fig. 7: a is the barrel enclosing the mainspring They are now rapidly being superseded by and turning, by means of the fusee chain b, the American clocks, which, on account of their cheapness, neatness, and portability, have become very and wheels d, c, f, the escape-wheel g. The hands

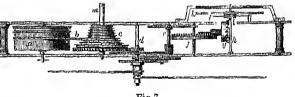


Fig. 7.

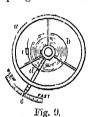
or motion train are exactly as described for clocks, and are similarly carried by the elongated arbor of the centre-wheel d. As will be seen in the fig., the fusee is of a peculiar shape. The reason is as follows: When the chain, which is fixed at the broadest part of the fusee, is fully wound up, it goes from the narrow part to the barrel where the other

end is fixed, and of course the spring is also fully wound. At this point the spring is strongest; and, pulling upon the narrow end of the fuse, has the east leverage. As it gradually unwinds, and at the same time becomes weaker, the leverage, owing to the shape of the fusee, becomes in exactly the o one shape of one three, becomes in exactly the same ratio greater, and thus the power on the muchinery is equalised till the whole chain is unwound. The spring is wound up by the squared arbor, m, of the fusce through an opening in the inside case; the arbor of the spring-barrel being of course fixed. An ingenious stop arrangement mecourse fixed. An ingenious stop arrangement prevents the possibility of damage by over-winding. The mainspring is a thin ribbon of finely tempered steel (fig. 8). The inner



steel (fig. 8). The inner end is hooked on to a eatel on the arbor of the harrel round which it is cailed, and the outer end to a catch on the inside of the rim of the harrel. In the Ameri-common, the fusee is

can watches, 110\W can wateries, now so common, the insee is dispensed with, and the great wheel is on the barrel and directly gives the motion. In recent years this form is also used in almost all keyless watches. The verge escapement shown in fig. 7 is exactly the same as that shown in De Vick's clock (fig. 2). Two pallets, h, i, moved alternately in opposite directions by the teeth of the escapement wheel cause a vibrating medion. of the escapement-wheel, cause a vibrating motion of the escapement-wheel, cause a vibrating motion in the balance k, which is steadied and regulated by the balance-spring l. The balance and spring are shown in plan in fig. 9: α is the balance and b the spring, which is arranged spirally. The inner end is fixed to the staff of the



balance, the outer to a stud c, fixed to the watch-plate. Its beautifully delicate motion may be observed in any watch, as all watches have the spiral spring except chronometers, which have a cylindrically coiled spring instead. The

length of the balance-spring in proportion to the weight of the balance is an important factor in regularity of motion, and for minute adjustment an instrument, d, c, called a regulator is attached to it. Two empins at d enclose the outer coil of the spring, and, in the case of the restate description and in the case of the watch going fast, a movement to the left lengthens the spring and retards the speed in proportion. For too slow a motion a movement to the right will shorten the spring and quieken it.

The principle involved in the clock-pendulum and watch-balance alike is that by their regularity of movement they shall keep the mechanism from going either too fast or too slow, and that in return the mechanism shall give repeated impulses sufficient to keep them perpetually in motion.

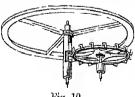


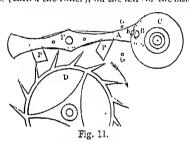
Fig. 10.

As the or verge escapement, owing to the recoil of the escape-wheel and other causes, is not to be depended on for very great accuracy, attempts were inmediately made after the invention of the balance-spring

to devise some form of escapement which would give better results. Hooke, Hnygens, Hautefeuille, and Tompion introduced improvements, lint the first to succeed was made by George Graham, the inventor of the dead-beat escapement in clocks.

This is called the horizontal or cylinder escapement (lig. 10). It was introduced in the beginning of the 18th century, and it is still the e-capement used in many foreign watches. The impulse is given to a hollow cut in the cylindrical axis of the halance by teeth of a peculiar form projecting from a horizontal crown-wheel.

Other forms of e-capement in high estimation are the lever, the duplex, and the chronometer 'spring-detent' escapement. The lever escapement (invented about 1770 by Thomas Mudge) is the dead-beat escapement (see fig. 4) adapted to the altered conditions of a watch. Fig. 11 shows the form used in most modern English watches. The pallets, P, P, are fixed to a lever, A (pivated at F), and there is an impulse pin, B (usually a piece of unby), set in a small disc Collect the willow, as they is of the larger. dise, C (called the roller), on the axis of the balance.



The ruly pin works into a notch at the end of the lever, and the pin and notch are so adjusted that when a tooth of the escape-wheel D leaves the when a tooth of the escape-wheel D leaves the pallet the pin slips ont of the notch, and the balance is detached from the lever during the remainder of its swing; whence the name detached lever escapement, originally applied to this arrangement. On the balance returning, the pin again enters the notch, moving the lever just enough to allow the tooth next in order to escape from the dead face of the pallet on to the impulse face; then the escape-wheel acts upon the lever and balance; the tooth escapes, and another drops upon the dead face of the pallet, the pin at the same time passing out of the notch in the other direction, leaving the balance again free. This arrangement is found to give great accuracy and steadiness of performance. A safety pin, E, on the lever, prevents the wheel being unlocked, except when the impulse-pin is in the notch of the lever. Two banking-pins, GG, keep the motion of the lever within the desired limits

In the duplex escapement (invented about 1780) the escape-wheel has two sets of teeth, hence the name. One set, something like the lever-wheel (fig. 11), lock the wheel by pressing on the balance staff, and the other, standing up from the side of the rim of the wheel, give impulse to the balance. It is rarely used now.

The chronometer spring-detent escapement was invented in principle by Le Roy about 1765, and perfected by Earnshaw (who also invented the cylindrical balance-spring) and Arnold about 1780. eylindrical balance-spring) and Arnold about 1780. It is shown in fig. 12; a is the escape-wheel, which has fifteen teeth; b, the impulse-roller, fixed on the same staff as the balance; c, the impulse-pallet; d, discharge-pallet; c, locking-pallet—all the pallets are of ruby or sapphire; f, the blade of the detent fixed at k by its spring q; and h, the gold-spring. In the fig. a tooth of the escape-wheel is caught on the locking-pallet; the discharge-pallet (carried round by the roller in the discharge-pallet (carried round by the roller in the direction of the arrow), by pressing on the end of the gold-spring, which in turn presses on the horn of the detent *i*, bends the detent enough to allow the tooth to escape from the pallet. The

escape-wheel, being released, overtakes the impulse-pallet and drives it on till their paths diverge and they separate. The wheel is again brought to a

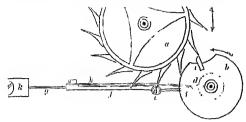


Fig 12.

stand by the locking-pallet of the detent, which, on being released by the discharge pallet, has spring back to its original position. The roller, having back to its original position. The roller, having made its vibration, is brought back by the spring. In the return the discharge-pallet forces itself past the end of the gold-spring, the impulse-pallet clears the teeth of the escape-wheel, and the balance goes on till the momentum is exhausted, when the spring induces another vibration, the wheel is again unlocked, and the impulse-pallet gets another blow. By receiving impulse in one direction and unlocking at every alternate vibration only, the chronometer-halance is more thoroughly detached than any other. It is very delicate, however, and, though the most perfect known, it cannot stand rough usage, and is not so suitable for ordinary pocket-watches as a good lever. At sea the chronometer is hung in Gimbals (q.v.), so as to be always horizontal whatever the motion of the vessel.

In watches, even more than in clocks, variations of temperature, unless provided for, produce variations in the rate of going. A rise in the temperature makes the balance expand, and there-fure augments its moment of inertia. It diminishes the clasticity of the spring; and the time of vibra-tion of the balance, which depends upon the moment of inertia directly, and upon the elastic force of the spring inversely, is increased—the watch, that is, goes more slowly. A fall in the temperature is attended by appasite results, the watch going more rapidly than before. Compensation can obviously be made in either of two ways by an expedient for shortening the effective length of the balance-spring as the temperature rises, so as to increase the clastic force of the spring; or by an expedient for diminishing the moment of inertia of the balance as the temperature rises, so as to correspond to the diminution of the force of the spring. The first method was that made use of by Jehn Harrison (q.v.) in his chronometer, and

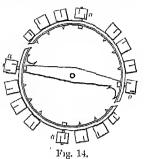


Fig. 13.

it depended on a laminated bar of brass and steel fixed at one end, called a compensation curb; the free end carries two curb pins, which embrace the balance-spring, and, as the bar shrinks and expands, regulate the length of the spring. It is never used

An adaptation of the other method, invented in 1782 by John Arnold, and improved by Thomas Earnshaw, is that which is always employed now.

Fig. 13 shows the form employed for marine chronometers, and fig. 14 that for pocket chronometerand watches: t, a, t (fig. 13) is the main bar of the balance; and t, h, l', b' are two compound bars, of which the outer part is of brass and the inner part of steel. carrying weights, c, c', whose position may be shifted to or from



the fixed end, according as the compensation is found on trial to be less or more than is desired. Brass expands more with heat and contracts more with cold than steel; consequently, as the temperaone end to the main bur, bend inwards at the free end, and so the moment of inertia of the balance is diminished; as it falls they bend ontwards, and the moment of inertia is increased; and of course the diminution or the increase must be made exactly to correspond to the diminution or increase in the force of the spring. The screws, d, d, litted to the fixed end of each of the compound bars are used for bringing the chronometer to time; sometimes the smaller ones are dispensed with. In fig. 14 the principle is the same: u, u, u, a are the time screw-(equally distributed in the water-balance); the others are for compensation, and their positions may be shifted or larger ones substituted if necessary.

The modern marine chronometer is just a large watch fitted with all the contrivances which experience has shown to be conducive to accurate time-keeping-e.g. the cylindrical balance-spring, the detached spring-detent escapement, and the compensation-balance. Harrison's chronometer, mentioned above, was the first, and was completed after many years of study in 1736. For a description, see British Horological Journal, vol. xx. page 120. After many trials and improvements, and two test voyages to America, undertaken for the satisfaction of the commissioners, the last of which was completed on the 18th September 1764, the reward of £20,000, which had been offered by government for the best time-keeper for ascertaining the langitude at sea, was finally awarded to him. Harrison made many other inventions and improvements in clocks and watches, including his maintaining spring to the fusce, to keep the works going while being wound; a form of remontoire escapement, &c.

Somewhat later than this several excellent chronometers were produced in France by Berthoud and Le Roy, to the latter of whom was awarded the prize by the Académic Royale des Sciences. Progress was still made in England by Mudge, Arnold, and Earnshaw, to whom prizes were awarded by the Board of Longitude. The subsequent progress of watch-making has been chiefly directed to the construction of pocket-watches on the principle of marine chronometers, and such accuracy has been obtained that the average error is reduced to one

The compensation of an ordinary balance chrouometer cannot be made perfectly accurate for all degrees of temperature, but only for two points. The explanation of this lies in the fact that, while the variations of elastic force in the spring go on uniformly in proportion to the rise or fall of the temperature, the inertia of the balance varies, not

second a day.

inversely as the distance of its weights from the centre, but inversely as the square of the distance of the centre of gyration from the centre of motion.

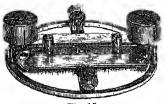


Fig. 15.

The particular points in the case of any chranometer are matter of adjustment. For instance, one chronometer may be made ta ga accurately in a

the pillar

temperature of 40°, and also in a temperature of 80°, at other temperatures being not so accurate; another chronometer to go accurately at a temperature of 20' and 60'. It is manifest that the former would be adapted to voyages in a wanner, the latter to voyages in a colder climate. To more fully adjust the compensation certain pieces are fixed to the balance to act in heat or in cold, and this is called auxiliary compensation, and there are at least two or three balances invented of recent years, one of which is shown in fig. 15, which are practically self-adjusting for the ordinary range of temperatures to which marine chronometers are subjected. The solution of the problem seems to be in setting the lamine flat instead of vertical, and making the bar also bimetallic.

Apparatus for testing chronometers have been long in use in the observatories at Greenwich and Liverpool. In the latter there is now an extensive apparatus for this purpose, devised by the ingeni-ous astronomer, Mr Hartunp. In a room which is isolated from noise and changes of temperature the chronometers are arranged on a frame under a glass case, so contrived that they may be subjected in turn to any given degree of temperature. The rate of cach under the different temperatures is observed and noted, and the chronometers regis-

tered accordingly.

A largo proportion of modern watches are made to wind and to set the hands from the pendant. Fig. 16 shows the form of keyless work chiefly employed in English non-fusee watches. The chief part is the three wheels working in the The rocking-bar ab, one of which gears with the winding-wheel, d, of the barrel when the rocking-bar, which is capable of a little motion, is in its normal place, as in the fig. A contrate wheel is fixed on the end of the winding-button c, and by its means,



Fig. 16.

the train is set in motion and the barrel wound. When the hands are required to be set, a push-piece in the case bearing on the end, b, of the rocking-bar is pressed by the finger, taking the rocking-bar wheels out of gear with the winding, and pucting them in gear with the hand-wheels at e. The hands

when the button is turned,

may then be turned by the winding button, and, the !

push-piece being let go, the train returns to its normál position. The use of the fusee being attended with some amount of complication in the keyless mechanism, it is usually dispensed with on this account, and one of the most modern arrangements in an English keyless watch is shown in fig. 17. occupy all the height between The barrel, a, is here made to

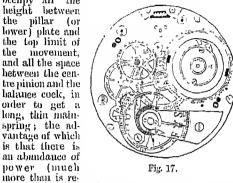


Fig. 17.

quired for a day's going), and only a portion of the spring is used for the ordinary winding for twenty-four hours. This practically insures an adjustment of the motive power as nearly equal to that obtained by the use of the fusee as it is possible to

Repeating watches were first made about 1676, the invention being claimed by Daniel Quare, Edward Barlow, and Tompion. They have a striking arrangement very much on the principle of the striking clock, and on compressing a spring they at any time strike the hours and quarters, and in some cases the minutes. They are very expensive and liable to go out of repair, and repairs are costly. They have nearly gone out of use. For stop-second arrangements to record swift

passing events, see Chronograph.

In England watches are mostly made at Preston, Liverpool, Coventry, and at Clerkenwell, London, where the division of labour principle is carried out in an extreme degree—many small factories making, for instance, only balances, others springs, others cases, others hands, &c., only that small number who put the works together seeing the complete watch. At Kew Observatory there are arrangements for testing watches, and granting certificates if satisfactory, on payment of a fee. In the United States the manufacture of watches, like that of clocks, is carried on in a much more wholesale manner; the wheels and plates being stamped by machinery, every similar part being exactly alike and interchangeable; and on account of the economy of manual labour, they can be turned out marvellously cheap. Generally the large clock-factories also manufacture watches.

See Thiout l'ainé, Traité d'Hortogerie (1741); Lepaute, Traité d'Hortogerie (1755); F. Berthoud, Traité des Hor-Traité d'Horlogerie (1755); F. Berthoud, Traité des Horloges Marines (1773), Histoire de la Mesure du Temps par les Horloges (1802); Thos. Reid, Treatise on Clock and Watch Making (1819); Jürgensen, Principes de la Mesure du Temps (1838); Moinet, Nouveau Traité général d'Horlogerie (1848); Wood, Curiosities of Clocks and Watches (1864); Denison (Sir E. Beokett, Q.C.), Rudimentary Treatise on Clocks and Watches and Bells (1874; 7th ed. 1833); Patent Office Abridgments of the Specifications relating to Watches, Clocks, and other Timekeepers; Saunier, Modern Horology (Eng. trans. by Tripplin & Rigg, 1885); Rombol, Enstignement théorique de l'Horlogerie (Geneva, 1889); Britten, Watch and Clock Makers' Handbook (1889); The British Horological Journal (monthly from 1859).

HOLOSCODE. See ASTROLOGY.

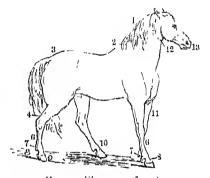
Horoscope. See ASTROLOGY.

Horrocks, Jeremian, an astronomer of remarkable genius, generally known as the first observer of the transit of Venus, an account of which phenomenon he has given in a Latin treatise entitled Venus in Sole visu. He was born at Toxteth, near Liverpool, apparently in 1619; he entered Emmanuel College, Cambridge, May 18, 1632; was appointed in 1639 to the curacy of Hoole, Lancashire, in which village he made his famous observation (November 24, 1639, 0.s.), while a mere youth. He died suddenly on January 3, 1641, the day before an intended journey, having promised to visit his chief friend, William Crabtree. Dr Wallis, his contemporary, informs us that Horrocks at the time of his death 'had not completed his twenty-third year.' Newton, in the *Principia*, bears honourable testimony to the value of Horrocks to the value of Horrocks in the transfer of the value of Horrocks in the transfer of the value of Horrocks in the transfer of the value of Horrocks in the astronomical work, especially commending his lunar theory as the most ingenious yet brought forward, adding, and, if I mistake not, the most accurate of all. Horrocks is frequently mentioned by the scientific men of the 17th century; the observation of the transit being by no means regarded as his sole astronomical achievement, as he added to our knowledge of the physical cause of eelestial motions, deduced the solar parallax, corrected the solar diameter, and made tidal observations. Hevelius printed the Venus in Sole visu, which first appeared in Germany (1662): a translation of this work, with memorr by Whatton, appeared to the solar parallax of the solar par peared at London in 1859. In 1678 Horrocks's fragmentary works were published under the auspices of the Rayal Society, being edited by Dr Wallis, with the title Jeremar Horroccii Opera Posthuma, &c. The name of Jeremiah Horrocks, long forgotten except by astronomers, is now, 'after the lause of more than two centuries,' engraven on marble in Westminster Abbey.

Horse (Equus), an ungulate or hoofed mammal of the order Perissodactyla, characterised by having an odd number of toes; the family Equidu formed the group Solidungula of old writers, owing to the presence of only a single hoof, which murks them off quite sharply from all allied animals. The Euglish name is found in Angle-Saxon as hors, and is cognate with the Icelandic hross, German ross; it is sometimes referred to Sanskrit root hresh, 'to neigh,' but, according to some, with more probability, to a Teutonic root har, 'to run,' cognate with Latin currere. The Latin name is no doubt from the root ak, conveying the idea of swiftness; Sanskrit açva; Gr. hippos or hikkos;

The existing species of the genus Equus are about half a dozen in number: (1) The Horse (E. caballus) is characterised by the tail being furnished with long hairs quite from its base; by the long and flowing mane; by the possession of a bare enllosity on the inner surface of the hind as well as of the fore legs; and by the head and ears being smaller and the limbs longer than in the other species. (2) The Ass (E. asinus) is almost as species. (2) The Ass (E. asnus) is annose as widely distributed as the horse; it is probably of African origin, being almost certainly conspecific with the Abyssinian form, E. terriopus. (3) The Asiatic Ass (E. hemionus) differs from the cammon ass in being of a more reddish colour, in the absence of the choulder thing and in having smaller care. of the shoulder stripe, and in having smaller ears. By some zoologists it is split up into three species—the Syrian Wild Ass (E. hemippus), the Onager —the Syrian Wild Ass (E. hemippus), the Onager (E. onager), and the Kiang or Dziggetai, to which the term E. hemionus then becomes restricted. (4) The Quagga (E. quagga) has dark stripes upon the head and shoulders on a brown ground; it is said to be now extinct. (5) Burchell's Zebra (E. Burchelli) is white, with stripes on the body and the upper parts of the limbs; it extends from the Orange River to Abyssinia.

(6) The Mountain Zebra (E. zebra) is white. with long black stripes reaching down to the feet. It is limited to the Cape Colony, and is rapidly disappearing. These last three are sometimes united into a special genus, Hippotigris, (7) The explorations of the Russian traveller Przhovalski (Projovalsky) in 1881 added another species to the list of Asiatic forms, which has been called after him. The long hairs of the tail begin only half-way down it; the mane is short and ereet, and there is no forelock; the head is large and heavy; the ears smaller than those of the ass. It inhabits the dry sultry regions of the Dzungarian Desert, living in companies of fifteen to twenty, each led by a stallion. Only two herds were observed, and only one specimen was secured. The resemblance which this species presents to the horse of early semptures has been pointed out by several observers.



Horse, with names of parts:

1, crest; 2, withers; 3, cromp; 4, hamstring; 5, hock; 6, cannon; 7, tetlock; 8, pastern; 0, hoof; 10, coronet; 11, arm; 12, gullet; 13, muzzle.

The anatomical structure of the horse has been the subject of many elaborate treatises, and only a very later outline of its more salient features can be offered here. The skull is remarkable for its great length, especially as regards the bones of the force which convey on extent twice here which because of the same treations. the co-operation that the boltes of the face, which occupy an extent twice as great as those of the eranium. The orbit is approximately circular and complete behind, a fact which distinguishes the horse from the tapir and rhinoceros, as well as from its fossil allies. The co-operation as wen as from 11s fossil alines. The co-operation of the zygomatic process in the formation of the lower part of the orbit is an unusual if not a unique feature. The great cheeks are formed mainly of the maxillary bones, though the lachrymal and malar bones occupy a considerable area in the upper portion. The mostriks are roomy, provided with extensive turbinal larges and revised. vided with extensive turbinal bones, and roofed in by the nasal hones, which are broad behind, pointed in front. In the naked skull the anterior openings of the nostrils extend for buck at either side between the nasal and premaxillary bones. The palate, like the floor of the eranium, is long and narrow, furning a kind of valley between the two rows of elevated molar teeth. Delow the brain-case there is a distinct canal through the alisphenoid bone for the internal maxillary artery. In the region of the ear the tympanic and periotic banes are fused together, but are loose from the skull, being held in position only by the descending process of the squamosal bone. The hyoid hone is well developed, especially as regards its anterior arch, and the basal segment sends a process forward into the tongue. The rhinoceros and tapir have a similar, but smaller, process. The mandible is very large, and the lower and hinder part is expanded into a broad flat plate for the attachment of the masseter muscle. The verte-production was a process of several englishment of the masseter muscle. bral column is made up of seven cervical, eighteen

dorsal, six humbar, five sacial, and fifteen or more candal vertebrae. Most of the vertebrae are more or less hallowed behind, this character being more marked in the fore than in the hinder part of the The dorsal processes of the vertebræ in the forepart of the chest are very ligh, and to them is attached the great elastic ligament (ligamentum nuchee) which relieves the muscles of the heavy weight of the head and neck. The sternum consists of six segments, the anterior one being shaued something like the prow of a bost. There are no collar-bones, these being in fact absent from all hoofed manumals (Ungulata). The shoulder-blade is long and narrow, and hears a prominent rounded tuberele, representing the coracoid bone. The lumerus is short and stout; of the two hones of the forearm the ulna is well developed behind, where it forms the great process (elecanon), projecting backwards from the chow-joint, but it tapers gradually away below, and is firmly fused with the radius. The wrist ('knee' of common speech) consists of six bones, disposed in two rows of three each; in the second row the middle bone (os magnum) is very large, and supports the cannoncosmagnium) is very large, and supports the cannon-bone, whilst the two laterals are small, and each supports a splint-bone. The fore-foot of the horse consists of only one fully-developed digit, corre-sponding to the middle linger of the human hand. The metacarpal bone of this linger is known as the 'cannon-bone,' and approximated to its upper end are the thin tapering rudiments of the second and fourth metacarpals, commonly known as 'splint-bones;' the cannon-bone is succeeded by three phalanges, known respectively as the 'large pastern,' 'small pastern,' and 'coffin-bone.' Behind the foot are three small bones (sesamulds), two behind the joint between the cannon-bone and large pastern (commonly called the 'fetloek'), and large pastern (commonly called the 'fetlock'), and a single one placed transversely behind the joint between the small pastern and the coffin-bone, commonly called the 'navicular.' In the hinder limb the thigh-bone has a prominent flattened pracess on its outer side, about one-third down; this is known as the 'third trochanter,' and is characteristic of all odd-toed ungulates. What is really the knee is known as the 'stifle joint.' The fibula is rudimentary. The tarsus consists of seven bones. The os calcis has a well-marked flattened heel-process, commonly known as the 'hock.' The bones of the hind-foot resemble very closely those of the fore-foot, and have the same closely those of the fore-foot, and have the same names. A very strong ligament passes down the hinder surface of the foot, and the two smaller sesamoid bones above mentioned are imbedded in it. It is commonly known as the 'suspensory ligament of the fetlock;' occasionally muscular fibres are found in its substance, and this fact, taken in conjunction with its position and attachments, shows that it is the representative of the interesseous muscles of the human hand. The navicular bone lies in the tendon of the deep flexor muscle of the foot.

The hoof is the representative of the claws or nails of other animals. The last segment of the toe is widened out to form a foundation for it, and this is increased by eartilaginous side-pieces and a fibrous and fatty sole-piece. The integrment is, of course, continuous with the skin of the limb, but it is extremely vascular, and its surface is developed into papille or lamine, which secrete the horny matter of the hoof. The chief share in this process is taken by the 'coronary enshion,' or thickened ring round the upper part of the foot, and by the cushion in the sole. The result of this is that the hard external tissue of the hoof is renewed from within as fast as it wears away on the outside. The lower surface which comes into contact with the ground is hollow, and its centre

is occupied by the 'frog,' a triangular entinence with its apex directed forwards, and consisting of pavenuent epithelial cells arranged concentrically. Other horny structures are the so-called 'chestnuts,' hard oval warts situated on the inner surface of all four legs in the horse (E. aballus), and of both fore-legs in the other members of the

genus

The teeth of the horse when the series is complete are forty-four in number: three incisors, one canine, four premolars, and three molars on either side of each jaw. The incisors form a semicircle: they have a pit in the apex partially filled up with bony matter, and this it is which produces the wellknown appearance of concentric rings as the tooth wears away, and their disappearance when the wearing has carried the surface of the tooth beyond the bottom of the pit The canines are either rudimentary or absent in the females. Between them and the grinding-teeth is a wide gap (dia-stema) in which the bit is placed. The first premolars are either quite rudimentary or absent; when present they are usually lost before maturity, so that the grinding-teeth in actual use only amount to six in number. They have very long crowns, which are gradually pushed up as the surface wears away; this peculiarity in structure is only seen in the teeth of the more recent houses, and is probably to be associated with the removal of the animal from swamps to drier plains, and hence from soft moist vegetation to food more difficult of mastication. The enamel of the teeth forms a curved folded plate, the pattern being derivable from that seen in other Perisodactyles; and it is this which produces the characteristic pattern seen in the surface of the horse's molars. The temporary or milk teeth are twenty-four in number—three incisors and three milk-molars on either side of cach jaw. At birth the first and second molars are present; at one week old the central incisors appear; at six weeks the two next incisors; at three months these incisors are level, and a third molar has come into view; at six months obliteramonths the central incisors; at eight months the lateral incisors lave errepted, making the full number of six in each jaw; at one year the fourth molar is visible; at eighteen months the mark is very faint in the central incisors; at two years old there are five molars; at three years the permanent central incisors replace the temporary ones; at three and a half and four and a half years respectively, the same happens with the second and the lateral incisors, and at the latter date the canines appear in the male; at five years the mark is nearly, and at six years quite effaced in hath is nearly, and at six years and connect in the central incisors; at seven years the like has happened to the next incisors; and at eight years the mark has disappeared from all the teeth, and the canines have become blunted. Hence by the presence of the different teeth and their condition as regards wear, it is possible to tell the age of a horse with considerable accuracy up to six or eight years of age, but after that no reliable conclusions can be drawn from these

organs. The lips are flexible; the palate long and narrow, and transversely ridged; the soft palate has no uvula, and, except during the actual process of swallowing, embraces the epiglottis, so that respiration is carried on entirely through the nostrils. Three pairs of salivary glands are present, the parotid being by far the largest. The stomach is simple and a good deal curved upon itself: at the escophageal opening is a kind of muscular valve to which is commonly attributed the difficulty which a horse experiences in voniting. The small intestine is eighty or more feet in length, and terminates in a large execum with sacculated walls. The liver is

almost symmetrical, and there is no gall-bladder. The heart is rather longer; the aorta gives off almost immediately a large trunk (the so-called 'anterior aorta'), which subsequently divides into the two axillary and two carotid arteries. The anterior apertures of the nostrils are large, and can be dilated by special muscles; immediately within the opening on the upper and onter side is a blind pouch ('false nastril') 2 or 3 inches in depth and of unknown function; in the ass it is even larger. There are also air sacs in the hinder and upper part of the pharynx which spring from the Enstachian tubes. The time of pairing falls be-tween the end of March and beginning of June. The period of gestation is eleven months, and only one foal is born at once. The mare is capable of breeding at three years old, but the stallion is not usually allowed to pair until four years of age. The average age of a horse may be put down at twenty years; the greatest age on record is believed to be

The senses of the horse are acute, though many animals excel it in this respect; but its faculties of observation and memory are both very highly developed. A place once visited or a road once traversed seems never to be forgotten, and many are the cases in which men have awed life and safety to these faculties in their beasts of burden. Even when untrained it is very intelligent: horses left out in winter will scrape away the snow to get at the vegetation beneath it, which eattle are never observed to do. Perhaps this may be inherited from their ancestors in the Siberian plains; but curiously enough the very same habit is observed in the horses of the Falkland Islands, whose ancestors in La Plata could have had no occasion to show the same instinct for many generations

back.

With patience and kind treatment the horse can be trained to go through quite complicated feats of memory and perception. That it possesses also an accurate sense of time is clear from the facility with which it can be taught to walk, trot, and dance to music, or take part in concerted evolu-tions. Its knowledge of tunes is evinced by its comprehension of military signals. It is very timid and cautious and suspicious of every new sight or sound; while in respect of moral qualities it is searcely too much to say that horses are as

diverse as men.

The history of the horse can be traced back, though with extensive gaps, to the leginning of the Tertiary geological period, where we find the remains of a small ungulate no larger than a fox, to which the appropriate name Echippus has been given. It was of very generalised structure, having for example four complete toes and a rudimentary fifth on the fore-feet. In Miocene times it was sneeeeded by Michippus and Anchitherium, which in their turn gave place to the Pliocene Hipparion and Pliohippus, each of these showing an increase in size and a closer approach in structure to the modern horses. The history of the feet in particular farnishes one of the best examples of the gradual evolution of a specialised from a more generalised organ (see FOOT). The skull and neek became coincidently more clongated, and the tecth underwent changes which have been already

alluded to.
The etymological synopsis above given shows that the horse was known to the Aryan people before their dispersal. Incised figures of the horse upon bones have been found in cave-deposits referred to the Paleolithic age, and there is evidence to show that at this period the animal was an object of the chase and a source of food. It was probably small and heavy, with a large head and an upright or hog-mane; and attention has been already called

to the resemblance which some of the sembtured figures of antiquity bear to the Equus przhevalskii

above described.

The horse reappears in Neolithie remains in the Swiss lake-dwellings and elsewhere, but here apparently still as an object of the chase. The precise date of its domestication is uncertain. On Egyptian monuments no trace of it appears before the expulsion of the Hyksos or shepherd kings; and it is generally stated that the animal was previously unknown to the Egyptians, though it can hadly be considered as proved that it was introduced by the Hyksos.

In Scripture the horse is only referred to in connection with warfare; witness the poetic description of the war-horse in the Book of Job. The earliest mention of the animal in Holy Writ occurs in connection with the famine in Egypt, when Joseph gave the people corn in exchange for their horses; and its use for riding is alluded to in

2 Kings, xviii. 23.

In Homeric times the horse was not used for riding; indeed, at the battle of Marathon (490 B.C.) the Persians, but not the Greeks, used cavalry. After 450 B.C., however, the art was practised in Greece, and a treatise upon it, of somewhat later date, from the pen of Xenophon, still exists. The war horses of the Britons and the chariots, their wheels armed with scythes, are described by Caesar. Athelstan paid special attention to the Casar. Athelsan pant special attention to the breed of English horses, and even imported animals from Spain, for its improvement. In this he was followed by other monarchs, as John and Edward III. In the reign of this latter king a law was passed forbidding the exportation of horses, and a passed forbidding the exportation of horses, and a passed forbidding the exportation of horses. number of Spanish jennets were introduced. Henry VIII. made various enactments for improving the condition of the English horse, particularly relating to the pasturing of entire horses upon commons and open lands, where a good deal of promiscuous and detrimental breeding had taken place. In the reign of Elizabeth it was penal to make over a horse 'to the use of any Scottishman,' a prohibition naturally repealed by her successor, who further signalised himself by bringing over to England the Markham Arabian, helieved to have been the first of that breed introduced. He did not prove a success; but still the experiment was repeated from time to time, and in William III.'s reign the 'Byerly Turk,' the first of a celebrated from the bartel was a Frederick of the transfer of the state brated trio, was brought over to England. At the very beginning of the 18th century came the 'Darley Arabian' (the sire of Flying Childers, 1715), and later the 'Godolphin Arabian,' or Barli (1724-53). The first of these was the great-grandfather of the celebrated racer 'Eclipse' (foaled 1764). 1764), from whom so many winners of important races have descended. Indeed, it is not too much to say that from one or other of these horses, in most cases from all three, all horses at present on the turf trace their descent in the male line. Since the commencement of the 19th century an accurate record has been kept of the descent of all racchorses, and an attempt has been made to carry the history about a century further back.

There has been much discussion and speculation as to the kind of animal from which the domestic horse has been derived. Colonel Hamilton Smith supposed that the modern breeds have descended from about five primitive differently-coloured stocks, but this view finds no supporters nowadays; rather is it maintained that 'the similarity in the most distinct breeds in their general range of colour, in their dappling, and in the occasional appearance, especially in duns, of leg stripes and of double and triple shoulder stripes, taken together, indicate the probability of the descent of all the existing races from a single, dun-coloured, more or

less striped primitive stock, to which our horses

still occasionally revert.

Whether the actual species thus alluded to is still living in the wild state is extremely uncertain; indeed it is held by many competent judges that no primitively wild horses now exist, the herds of horses that roam over the Russian steppes being supposed to be the descendants of animals which were once domesticated, and have relapsed into the feral state, as is known to be the case with the mustangs of South America.

The Tarpan, or wild horse of southern Russia, is a small animal, with thin, but strong, long-jointed legs, longish thin neck, and comparatively thick head, pointed ears directed forwards, and small vicious eyes. The coat in summer is close, short, and wavy, especially behind; in winter it is thick and long, forming a kind of beard under the chin; the mane thick and bushy, the tail of moderate length; the colour generally pale brown or yellowish in snumer, almost white in winter. It is found in sonthern Russia, but (according to Radde) is absent from Central Asia, even from the north of the Gobi, where the dziggetai is found. It lives in large herds, often numbering several hundreds, subdivided into little groups or families, each presided over by a stallion, who protects his retinue valiantly, but permits no irregularities in their behaviour; young horses keep at a distance on the outskirts of the hord until they are able to under-take the cares of a family for themselves. The stallions are ever on the alert with nose and car to detect the approach of danger, of which they give notice by a foud neigh, upon hearing which the whole herd takes to flight, sometimes disappearing as if by magic from the crafty manner in which they take advantage of irregularities in the ground. The story that they protect themselves by forming a ring with heads directed inwards has no foundation in fact, although the stallions will defend the mares and feals from impending attack. The stallions light vigorously among themselves with teeth and hoofs, and each as he attains maturity must win his position in the herd by a series of duels. They present all the appearance of truly wild animals, and are regarded as such by the Tartars and Cossacks, who destroy them on all possible apportunities, because they are useless for taining purposes, and because they infliet considerable damage upon these horse-rearing communities by devouring their stores of hay and enticing away their mares.

The South American wild horses, known as 'cimmarones' or 'mustangs,' are reported by Azara to be the descendants of some half-dozen individuals which were left to their own resources when the town of Buenos Ayres was abandoned about 1535. When in 1580 the town was reinstated, they were found to have increased to a very considerable number. They are of the same size as the domestic horses, but with thicker heads and legs, and longer necks and cars; all are brownish or blackish in colour. Their social system is the same as that of They proceed in Indian file, leaving the tarpans. no gaps in the series, and are avoided by travellers owing to their attempts to entice tame horses into their company, not unfrequently with success. The Indians on the pumpas eat the mares and foals, and also capture a certain number in order to tame them; but the Europeans make no use of them, except perhaps to kill one when fuel is scarce in order to replenish the camp-fire with its marrow.

The accounts given by travellers of these animals

differ in many important particulars.

The subject of the horse's paces is one which has given rise to much controversy. It has been maintained that horses in a wild state use only the walk and gallop, the trot and others being the

results of education. This question can hardly be regarded as settled even now, for the fact that quite young foals have been observed to trot beside their dams is explicable as an instance of beredity.

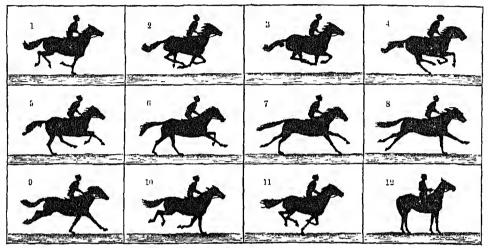
Six well-marked paces may be distinguished in the movements of domesticated horses—the walk, the amble, the rack or pace, the trot, the canter, and the gallop. The study of the precise movements of the different limbs in carrying out these paces is very difficult, especially in the case of French physiologist, was the first to attempt a rigorous analysis of these movements by means of apparatus. He attached to the horses' hoofs small elastic bags, connected by tubes with pointers, which made marks upon a revolving cylinder. When any one of the feet touched the ground the bag was compressed, and the pointer instantly made a corresponding mark upon the cylinder. Very valuable results were obtained by this method of study; but they need not be further detailed here, as they have been superseded by the beautiful photographic investigations of Muybridge. In these experiments the horse was made to proceed along a track in front of a row of twelve or twenty four cameras, so arranged that, as the animal passed in succession before each of them, an instantaneous photograph of it was obtained. These pictures furnish the of it was obtained. These pictures furnish the means of analysing the various paces, as the exact attitude of the horse is shown at very short intervals of time. In the case of an ordinary walk the horse has always two and sometimes three feet on the ground at once. The order of the succession of the footfalls is as follows: left hind, left fore, right hind, right fore; furthermore the horse is alternately supported by the two feet of the same side (laterals) and by a hind and a fore foot of different sides (diagonals); when the animal rests upon the laterals, the suspended feet appear in a side view between the supporting feet; when upon the diagonals, the suspended feet hang out one in front of and the other behind the supporting feet. These rules furnish the means of testing the accuracy of artistic representations of walking horses. The amble is a rapid walk, the length of time the fect rest upon the ground being reduced so that the body is often supported upon only one foot, and generally only on two. The rack, or as it is called in America the 'pace,' is a step but rarely seen; in it the laterals move synchronously with each other, so that a horse performing this action has been apply compared to two men running one behind the other and keeping step. The trot has been defined as a pace characterised by the synchronous movement of the diagonal limbs, though in practice the movement is rarely, if ever, quite simultaneous. It has often been maintained liy experienced horsemen that a horse in trotting has always at least one foot in contact with the ground. So far, however, is this from being the case that a fast trotter is quite unsupported for more than half the distance he traverses in each stride. In the canter the order of the footfalls is the same as in the case of the walk, and the characteristic difference is due to the peculiar rhythm as well as to the final effort which propels the body at the conclusion of the stride as the fore-leg leaves the ground.

We may analyse the gallop by the aid of the accompanying reduced silhouettes copied from Muybridge, and then it will be seen that its conventional representation by artists is quite unlike any of the actual positions assumed by the moving animal. Fig. 1, it must be remem-bered, does not represent the start of the gallop, but merely a phase in a continuous action; the body is moving forward by impetus already acquired, and the fore-foot just leaving the ground

794

Fig. 2 is twenty-seven inches is adding to it. further forward; the leg which was on the ground in the last became so aslant that it was obliged to quit the ground, and is now thrown backward; the hind-legs are gathering up and coming forwards preparatory to descending. Fig. 3 shows no further propulsion, but the hind-legs are still moving forwards. In fig. 4 one hind-leg has just touched the ground, the other is at its greatest extension; one fore-leg has come forward about half-way. In fig. 5 both fore-legs are being extended in advance; one bind-leg is pushing upon the ground, the other being brought down. Fig. 6 shows both hind-legs at work propelling the body

forwards and upwards; one leg has nearly done its work, the other just begun; one fore leg is at its maximum forward range, the other is being projected. In fig. 7 one hind-leg has left and the other is just leaving the ground; one fore-leg has reached the ground and is just beginning its stroke. Fig. 8 shows both hind-legs in the air, and the weight of the body supported upon one fore-leg. In fig. 9 one fore-leg is doing its stroke, the other is nearly ready to begin; the hind-legs remain much as in the last diagram. In fig. 10 one fore-leg has left the ground, the other is at work upon it; and the hind-legs are being brought forwards. This brings us to the end of the series,



The Horse in motion (after Mnybridge).

for fig. 11 is really intermediate between ligs. 1 and 2. One or two facts may be seen from these diagrams, which, though small, are accurate. The greatest propulsive force resides in the hind-legs; as the weight of the horse descends upon any one of its feet, the strain upon the limbs is so great that the pastern joint lies quite horizontally; the the pastern joint less quite norizontally; the legs are bent when taken up and straightened in the descent; the heels strike the ground hefore the toes. The length of a stride in the different paces may be approximately stated as follows: walk, 6 feet; amble, 10 feet; rack, 12 feet; trot, 8 to 18 feet; canter, 10 feet; gallop, 12 to 20 feet. In the matter of speed a horse may be said to walk 4 or 5 miles an hour, trot under saddle 6 to 12 miles, or in harness 10 to 12 or even 14; as regards a gallop, the fastest records seem to be 3 miles in 5 min. 42½ sec.; 1 mile in 1 min. 43 sec. It is stated that some of the old Cleveland horses could earry 760 lb. for 60 miles in twenty-four hours, and Lawrence gives a story of a Galloway which heat the coach from London to Exeter (172 miles) by a quarter of an honr, notwithstanding its frequent relays of fresh horses.

A few words must be devoted to the various

domestic breeds of horses.

The racer is the one for which England is pre-eminently famous, and his origin from the com-bination of oriental with native blood has been above alluded to. The age of the racehorse whenever foaled is reckoned from the next 1st January, and hence it is advantageous that they should be born early in the year, so as to gain as much time as possible for development. In July or August of the following year the serious training for the two year and three year old races now in vogue begins. Very few horses now race after four years

old, but are used for stud purposes, at prices varying with the success they have attained on the turf.

Successful racehorses vary much in shape, some heing small and neat, others tall and bony. In height they may be said to range from 15 to 16; hands (the hand = 4 inches), though the most usual dimensions are between 15; and 16 hands; the head should be light and well set on the neck, the ears small and pricked, the eye large, and the nostrils wide and expansible. The neck must be moderately long, and must combine muscular development with lightness; the windpipe broad and loose; the withers may be high and narrow; but it is imperative that the shoulder be sloping and muscular. The body should be moderately deep and straight; length should be given to it by the shoulders and hips; the loins must be broad and firm; the hips long and wide. The limbs ought to be well proportioned and cleanly modelled; the fetlock-joints large and the pasterns strong; the feet of moderate size, with no sign of contraction either in the heels or the fregs. The tail should be set on high. Most important of all is it that the different parts should harmonise together, and that the action should be good. Colour is perhaps of less consequence; still it is worthy of remark that for a long time the majority of winners have been chestants.

At his fastest speed a racchorse may cover a mile in 1 min. 43 sec.; the rate of a mile a minute currently attributed to Eclipse is, according to a competent authority, 'wildly incredible.'

In America the favourite form of horscrace is the

trotting-match, which appears to have originated in the prohibition of horseracing by the Puritans. The gradual evolution of the fast trotter is remark-

uble. In 1828 a bet of \$2000 was made and lost that no horse could trot one mile in 3 minutes. 1852 the time required for that distance was 2 min. 26 sec.; in 1866, 2 min. 18 sec.; whilst in 1881 it had been brought as low as 2 min, 10.5 sec. 1843 there was one horse that could do the mile in 2½ min., whilst, in 1871, 233 horses, and in 1882 no less than 1684 could accomplish this feat.

TROTTING.

The hunter is sometimes, but not often a thoroughbred. If this be the case, he is generally a horse that has failed to stand the test of the short rapid races, and is thereafter trained for a hunter. He differs from the racer mainly in carrying-power and endurance. A deep girth, with broad hips, a back not over long, and strong legs are his most essential characters. Jumping is a most necessary accomplishment. A five-baried gate is the ordinary limit of a leap; but a few houses have been known to clear heights between 6 and 7 feet. Yet only a few will jump 10 or 12 feet of water in the luntingfield, although horses have been known to leap a distance of 36 feet.

The charger ought to be 15.3 hands high. should be a good weight-carrier, and the paces should be easy, owing to the regulation length of the military strrups. Furthermore, as the soldier has to devote his right hand to the management of his weapon, only the left can be used for guiding his steed, which has thus to be accustomed to take its instructions from the pressure of the leg

or indications given by the heel.

Harness-horses are of all degrees of value, and of varieties of race and breed, from the tall high-stepping bays, 16½ or even 17 hands in height, which draw the four-in-hands of the wealthy, to the little pony which drags a basket phaeton. A really well-matched pair of carriage-houses of good action will fetch a very high price. For horses drawing light vehicles, 15-1 hands is an average height; those preferred for coaching are taller, and the wheelers are commonly an inch higher than the leaders.

Cart-horses, like other harness-horses, are of all kinds. The enormously heavy animals which have been developed as the result of crossing the native blood with Flemish are now to be seen almost exclusively in the drays of brewers; for the most part they are bred in Lincolnshire, and are expensive to rear, and hence to unrelease. The old Cleveland breed and the Suffolk Punch are said to be now extinct, and the Clydesdale is perhaps the favourite breed for this purpose at the

present time.

A pony is defined as being a horse under 13 hands high; the Exmoor ponies are a valuable breed, with well-shaped head, good quarters, and powerful hocks. For small dimensions the palm is, however, carried off by the Shetland breed, the height of which is often as little as 10 hands, and

not unfrequently less even than this,

In the manner of stable management it is of first class importance that the stable itself should be in a healthy locality, and free from even the suspicion of bad smell or foul air, to both of which horses are particularly sensitive. The stalls should be roomy, and the slope of the floor no more than is needful to allow the drainage to run oil; indeed an arched floor is to be proferred to a smooth slope. The stalls should be adequately lighted, but the eyes should not be strained by the use of too light paint or whitewash on the walls. Good ventilation is imperative, and should be achieved without exposing the animal to cold draughts. About 55° F. is the mean temperature to be aimed at, but it is very often impossible to keep it down nearly so low as this; in winter it is easy to keep it up, or even if this fail, the difference can be made up by clothing. In all matters pertaining to the treat-

ment of a horse, regularity and moderation are

the great secrets of success.

The food varies much with the natme of the work the horse is called upon to perform, and the means of his owner. A cavalry charger is allowed 10 lb. oats and 12 lb. hay per diem; an ounnibus horse 17 lb. of mixed oats and maize, the proportions varying according to the relative prices of the two grains, and 10 lb. hay. A hunter is very commonly allowed 12 lb. oats, 2 lb. beans, and 6-8 lb. hay.

A certain moderate amount of exercise every day is necessary; nothing is worse than excessive fatigne one day and entire rest another. Two hours walking will as a rule suffice, but the needs and capabilities of different animals must be studied by those who have the care of them; in all cases it should be enough to prevent under lidgetiness when the animal is used by his master.

House-breaking, a process through which all young horses have to go before they are fit for work. The racehorse is generally broken when about eighteen months old, but carriage and draught houses are not broken until four-year-olds, though many farmers break their horses for light work at an earlier age. The process differs considerably in various countries, but that in use in England, though the slowest, is the most thorough, and the only one fitted to break a really valuable horse without risk. The chief requisites for a good horse-breaker are gentleness and unlimited patience, as a lasty action may undo days of work. Before the commencement of the training, the horse is accustomed to be touched by a man, and to the feel of a halter. After he is familiar with his breaker, who should on no account be changed, he is taken out with leading rein and hater until used to being led. The breaker my then commence to 'mouth' his charge—i.e. teach him to miswer the pre-sure of the bit. This is generally done by placing a lit in the horse's month every day while in the stable, until he is used to the metal; he is then driven with long reins attached to his bit, by the breaker, who walks behind and turns his pupil in various directions until he answers the rein readily. After the monthing has been thoroughly done, the horse may be mounted or harnessed and gradually accustomed to his proper work. As the majority of horses do not repay so much trouble, they have to be broken more quickly, but in the case of a high-bred animal at the risk of his comage or his temper.

In 1858-60 great attention was called to the system of an American called J. S. Rarey, who broke horses thoroughly in an hour. The essence of Rarey's method (a method published many years previously, but first introduced to the public by Rarey) was the 'casting' or throwing down of the horse, and frightening him so thoroughly that he gave no further resistance. Twenty years later much discussion was raised over an Australian system, said to differ entirely from Rarey's, but which only differed in the fact that the borse's head was tied to his tail until he fell, instead of violently casting him. Both of these systems, while of great utility in the ease of a vicious horse, or where horses are plentiful and of little value, are much too severe to be undergone by a high-couraged but nervous colt, who only requires

patience and gentleness to master him,

From 1784 a tax was imposed upon horses and horsedealers; in 1869 this was fixed at 10s. 6d. on each horse or mule, and £12, 10s. was charged for a dealer's license; the tax was removed in 1874.

In the year 1888 no less than 11,505 horses were imported into the United Kingdom from various parts of the world, chiefly from Germany (6667) and Denmark (2234), the average value of the animals being nearly £18. In the same year 12,880 home-bred horses were exported, the greatest numbers going to Canada (2683) and Belginm (2553); the average value was over £65.

(2593); the average value was aver 103.

There are works on the horse by Sidney (new ed. 1887), Walsh ['Stonehenge'] (new ed. 1880), Yonatt (new ed. 1882), Cuyer and Alix, Le Cheral (Paris, 1886); on the history of the horse, by Lawrence (1809); on horse-management, by Mayhew (1864), and others; on the anatomy of the horse, by M'Fadycan (1884); on horse-breaking, by Moreton (1883), and Hayes (1889). See also the articles RIDING, HIPPOPHAGY, VERRINARY MEDICINE, GLANDERS, BROKEN WIND, &c., and for a full list of books and BROKEN WIND, &c.; and for a full list of books and papers relating to the horse. Huth's Bibliographical Record of Hippology (Lond. 1887).

Horse, Master of the, the third great officer of the court, who has the superintendence of the royal stables, and of all horses and breeds of horses helonging to the Queen. He exercises authority over all the equeries and pages, grooms, coach-men, saddlers, and farriers, and has the appointment and control of all artificers working for the royal stables. He is answerable for the disbursement of all revenues appropriated to defray the expenses of his department; but his accounts are andited and examined by the Board of Green Cloth. He has the privilege of making use of the royal horses, pages, and servants, and rides next to the monarch on all state occasions. The office is one of great antiquity, and is considered a position of great honour. He is appointed during pleasure, by letters-patout; but his tenure of office depends on the existence of the political party in power. The salary is £2500 a year.

Morse-chestnut. See Chestnut.

Horse-fly. See Forest-fly.

Horseguards. See Guards. The name is also applied to a large public office in Whitehall, appropriated to the departments under the general commanding-in-chief. The word Horseguards is used conventionally to signify the military authorities at the head of army allairs, in contradistinction to the civil chief, the Secretary of State for War.

Horse-hair. See HAIR.

Horse-hair Worm. See HAIR-EEL.

Horsemanship. See Riding.

Horsens, a Danish scapart, at the head of the Horsensfiord, 32 miles SSW, of Aarhuus by Pap. 12,654. rail.

Horse-power. The word power is of frequent use as a scientific expression. Thus we speak of steam-power, water-power, and so on. When used in this sense it is quite obvious that reference is merely made to the nature of the store of energy in the particular motor under consideration. Again, when we speak of the total energy of a given system as the total power that it has of doing work, it would seem to be almost an insult to the mental power of our auditor to tell him in addition that by the latter phrase we mean simply total work measured in terms of any convenient unit. But it is often necessary to know the quantity of work which can be produced in a given time by a given motor. It is in this connection that the term one horse-power is used to denote the rate at which on the average a horse can do work per unit time, and this rate is adopted in Britain as the unit rate of working. Estimates of its numerical value necessarily differ very much; and so, in order to get a definite unit available for scientific purposes, the convention is made that the original estimate of Beulton and Watt shall be regarded as correct. The value which they gave was 33,000 foot-pounds per minute.

An ordinary rule for calculating the horse-power of a steam-engine is to divide by 33,000 the continued product of the area of the piston in inches,

the pressure in pounds weight per square inch, the length of the stroke in fect, and the number of strokes per minute. Thus, by the horse-power of an engine we merely mean the immerical rate of an engine we merciy mean the innution ince at which it can do work, expressed in terms of the above conventional unit, and this number obviously coincides with the number of horses to which the engine is equivalent as regards work in the same time. Of course the available horse-power is less than the actual hurse-power as got by the above rule, because of the work which has to be done against friction in the engine itself. See STEAMENGINE. The term man-power is similarly used, being usually taken as one-eighth of a horse,

Horseracing. Horses were used for harness purposes before they were ever ridden; and chariot-races took place before horses raced under saddle. The earliest mention of chariot-races occurs in Homer (Hiad, xviii.), who gives a clear description of those contests. The programme of the Grecian games included horseracing in the 33d Olympiad tie. the year 648 B.C.; some authorities give the time as the 23d Olympiad, though this earlier date was that of chariot-racing. Racing can thus claim a history, albeit a broken one, of nearly 3000 years, and of the property and the control of the property and the prop and, at the period above mentioned, it was so far reduced to a system that the horses had to be entered and sent to Elis at least thirty days before the contests began, the riders spending the month in a course of training and exercise. The 71st Olympiad, or 496 B.C., the Greeks instituted a race called the 'Calpe,' which was confined to mares, just as the One Thousand Guineas and the Oaks are now; while according to Grote's History of Greece it would appear that, in course of time, a certain number of races were restricted to colts of one age, so that they might not labour under the disadvantage of competing under equal weights against older horses. In the 10th century, Huga Capet accompanied his request for the hand of Capet accompanied his request for the hand of King Athelstan's sister by a present of several German running horses. In the reign of Henry II. 'hackneys and charging steeds' raced at Smithfield; and under Richard I, we hear of a course three miles long, with a prize of 'forty pounds of redy golds' for the winner. To James I, the credit is commonly assigned of having placed the turf on a permanent basis. His taste for racing appears to have been festered by a cardioted direction to the second se have been fostered by an accidental circumstance. It is said that several Spanish horses, thrown overboard from the ships of the Armada, reached the const of Galloway, and proved superior in speed to any of the native horses. The suitableness of Newmarket as a site for racing had been perceived prior to the advent of James I., who, however, lost no time in witnessing the races there, as he was present in 1605, probably for the first time, that being two years after his accession to the throne. It is worth mentioning that the king was at Lincoln races in 1607, because, on the occasion of a race taking place there on the 3d April, the king appears to have acted as a sort of clerk of the course, for he caused the track, a quarter of a mile long, to be 'raked and corded with rope and hoopes' on both sides, whereby the people were kept out, and 'the horses that rouned were seen faire '(Nichols' Progress of James I.). Cromwoll was, to a certain extent, an upholder of racing, though perhaps he did more for breeding than for racing; but Charles II. greatly encouraged the turf, and caused races to be held near whatever place he might happen to be staying. Queen Anne, as is well known, kept racchorses, ran them in her own name, and gave plates to be run for. None of the first three Georges signalised themselves by extreme love for the turf; hut it was in the twenty-third year of George III. that the Horse Tax, which interalia imposed a duty of two guineas

upon every horse entered or starting for any plate, &c., was passed. Before George III.'s long reign came to an end the Prince of Wales was a prominent figure in the racing world, his career as a horse-owner dating from 1784. In 1786 the stud was sold in consequence of the pecuniary embarrassments of the prince; but, on parliament generously increasing his income, he took to racing once more. When the prince next gave up racing it was for a very different reason. His horse Escape was entered to run on the 20th and 21st at the Newmarket October meeting in 1791. On the first day it was beaten by three others; but on the second day it won easily, whereupon unpleasant remarks were made, the Jockey Club took the matter up, and Sir Charles Bunbury told the prince that if he continued to allow Chifney to ride his horses na gentleman would start against him. Rather than sacrifice his jockey he retired from the turf, though he made a modified reappearance in 1805 at the request of the Jockey Club; but the royal stable was nover represented at Newmarket after 1808. William IV. naturally had no taste for racing, but as a sort of duty he kept on so that the nominations should not become void.

Since the accession of Queon Victoria the turf has not received any particular encouragement from royalty; in fact, from a purely racing view a retro-grade step has been taken, as in 1880 the Queen's Plates were discontinued, and the sum they represented was increased to £5000, which has been semed was increased to adolo, which has been handed over yearly to the Royal Commission on Horse-breeding, who have expended this amount in promoting the breeding of hunters and other half-bred horses. Since the time of William IV. no member of the royal house award racehorses until the Prince of Wales bought a few.

Of all the meetings held at the present time the ground Chesteria would be the present time the

one at Chester is possibly the most ancient, as an order bearing date 10th January 1571 provides for the Saddlers' ball, which was of silk, being changed into a silver bell of the value of 3s. 4d., and this bell was to be the prize for the horse 'which, with speed of runninge, then should runne before all others.' In 1610 the one silver bell was changed into three 'cupps,' and the race was then known as 'St George's Bace.' In 1623 'one faire silver cupp,' worth about £8, was substituted for the three caps. The Chester Cup, as at present constituted, was first run for in 1824. In Yorkshire, a horseracing county pur excellance, races took place, according to Camden's Britannia, as early as 1590 in the forest of Galtres, on the cast of York, the prize being a small bell with which the head of the winning horse was decorated; while Drake, in his Eboracum, states that, when the river Ouse was frozen over in 1607, a horserace was run upon it from the tower at Marygate end, through the great arch of Ouse Bridge, to the Crane at Skeldergate Postern. On the Knavesmire racing dates from 1709, though the first race for the King's Gaineas did not take place till 1731. The St Leger has done more than anything else to make Doncaster Town Moor famous; yet, though races do not appear to have been held there so early as at Chester or Newmarket, so long ago as 1703 the Yorkshiremen pitted their horses one against another, and twelve years later the corporation of Doncaster contributed towards the stakes. In 1776 a sweepstakes was won by the Marquis of Rockingham's Allabuleulia, and in 1777 by Mr Sotheron's Bourbon. In 1778 the race, the conditions for which were identical with those governing the aforesaid sweepstakes, first received the name of the St Leger, the proposal to so designate it emanating from the Marquis of Rockingham, who presided at the dinner held at the Red Lion on the entry day. A Colonel St Leger, who lived near

Doneaster, originated the sweepstakes in 1776. and the race received its name in his honour. Since its first institution the conditions of the race and the weights carried by the horses have several times undergoue alteration. Ascot (q.v.) has been a seat of horseracing since 1711.

Elsom (q.v.), perhaps the most popular race-course in England, first became famous in 1630 for its mineral waters. It is uncertain when racing was first practised, but it certainly existed in 1648, and in 1660 Pepus regrets his inability to be present at Banstead Downs to see a great horse and foot race. When racing at Epsom was in its infancy the usual custom was to decide a race in the forenoon, after which the whole company went into the town to dinner, and if another race was fixed for the same day, it took place after dinner. In 1780 the Derby Stakes were first instituted, and named after one of the turf's best and most influential supporters—the twelfth Earl of Derby. In point of antiquity, however, the Oaks can claim precedence over the Derby, the Ludies' Race' having first taken place in 1779. On thirteen occasions since the Derby was first run the winner of that race has succeeded in also win-uing the St Leger. Champion achieved the dual victory in 1800; and then ensued a period of fortyeight years before the feat was again accomplished by Suplice in 1848; and then, strange to say, the same horse won both races in two successive years, Hying Dutchman and Voltigenr winning in 1849 and 1850 respectively. The other double winners have been West Australian in 1853; Blair Athol, nave been West Australian in 1853; Blair Athol, 1864; Gladiateur, 1865; Lord Lyon, 1866; Silvio, 1877; Iroquois, 1881; Melton, 1885; Ormonde, 1886; and Donovan, 1880. The St Leger has been won by the Oaks winner on six occasions—viz. Formosa, 1868; Hannal, 1871; Marie Stuart, 1873; Apology, 1874; Janette, 1878; and Seabreeve, 1888. The Two Thousand Guineas, Derby, and St. Leger have been won by the same borse. and St Leger have been won by the same lorse four times only. The first-named race was first ran in 1800, but it was not till 1853 that Mr Bowes's West Australian succeeded in carrying off all three events; the other weavers of what has heen grandiloquently termed the 'triple crown' being Gladiateur in 1865, Lord Lyon in 1866, and the famous Ormonde in 1886; but in 1868 Fornosa, winner of the Oaks, had been previously successful in the Two Thousand, and subsequently won the St Leger. Although with the more prominent owners the Derby continued to be regarded as the race of the year, statistics show that for some reason or other the great event was scarcely keeping up its character. In 1867, when Hermit won, there were thirty starters, but that number has never been reached since; and it is only in the years 1869, 1873, 1874, 1875, and 1873 that the starters have 1872, 1874, 1878, and 1879 that the starters have numbered between twenty and thirty. In 1886 numered between twenty and thirty. In 1886 and 1888 there were nine competitors only, and a proportionate falling off is noticeable in the cases of the other 'classic races, as they are termed. This is doubtless owing to the competition of the rich stakes offered by the executive of the gatemoney meetings. In 1880 the sum of £2000, at that time the largest amount ever given to any one race, was added to the Manchester Cup. Since that time stakes have been increasing in value. The Sandown Park Eclipse Stakes, founded in 1886, was in 1889 worth £11,160; the Royal Stakes at Kempton Park, first run in 1889, was worth £9500; the Portland Stakes at Leicester, for two year-olds, amounted to £5250; and the Prince of Wales's Stakes, for three-year-olds, at the same meeting, to £11,000. Whether these valuable prizes are for the ultimate good of the turf remains to be seen; but it is indisputable that they have materially interfered with the old-established races; so in

order to keep pace with the times it has been arranged that the Derhy shall never be worth less than £5000; the race of 1890 being the first to come

under the new order.

During the flat-racing season of 1889 the value of the stakes competed for reached the unprecedented sum of £480,889, 188., of which no less than £73,858, 108. was won by the Duke of Portland, a sum very far in excess of the winnings of any other owner. Donovan alone won £38,666, 15s.; Ayrshire, £20,660; and Semolina, £9285, 88. Mr H. Milner was credited with £21,545, 68., and Chevalier Ginistrelli with £21,867, 11s. For yearlings of fashionable pedigree large prices are always forthcoming; but the record was reached when, in 1876, 4100 guineas were paid for Maximilian. That high figure, however, was very nearly approached in 1880, when, during the St Leger week at Doneaster, Colonel North gave 4000 guineas for a colt by St Simon—Garonne; and, to illustrate the value set upon good blood for lneeding purposes, it may be mentioned that Mr D. Baird paid 4000 guineas for the broad-mare Allegra when she was put up during the July week at Newmarket.

Flat-racing is altogether under the direction of the Joekey Club, and, by rule 65, any horse running at a meeting not under Jockey Club rules is thenceforward disqualified for ever from running at meetings at which the rules are in force. The Jockey Club appears to have come into existence during the reign of George II.; and the first mention of it occurs in Heber's Racing Calendar for 1758, in connection with a regulation passed in the March of that year directing all riders to pass the scales when they came in, under pain of dismissal. In the volume on Racing in the 'Badminton' series, the writer on the 'History of the Jockey Club' says that Jockey Club. At anyrate a room on the site of the present Jockey Club buildings was creeted in 1752 on ground leased by William Erratt, a horsedealer, to the Duke of Ancaster and the Marquis of Hastings, in trust for fifty years. The rules of of Hastings, in trust for fifty years. The rules of racing are promulgated by this body, and are altered from time to time as chemnstances may suggest. In 1889 the rules were entirely recast, and came into force with the commencement of the season of 1890. The new code confers increased responsibilities and power upon the officials, and makes several changes in the rules which had pre-viously been in force. The 'apprentice allowance' has been done away with, and the restriction which formerly precluded foreign horses from being handicapped in England unless they had been six months in the country has been abolished. The object of the rule, which to some persons was vory obnoxions, was to enable the handicapper to have some know-ledge of the previous performances of the horses to which he had to assign weight. The Joekey Club is a self-constituted body, and many of its acts are neither recognised nor governed by the law of England; yet with respect to racing it discharges many important functions. No duty, however, has been more disagreeable than the one it was called upon to perform in 1889, when the stewards, Mr James Lowther, Lord March, and Stewards, and James Loweller, Lord Mattern, and Prince Soltykoff, sat as arbitrators in the case of Sir George Chetwynd v. Lord Durham, which was an action originally brought in a court of law, but afterwards referred, with the assent of buth parties, to the Joekey Club. The proceedings arose out of a speech made by Lord Durham at the Gimerack dinner at York in 1887, in which sundry charges

were made against certain persons on the turf.
According to Ruff's Guide, 2100 horses ran in the
year 1889. Of this number 988 were two-year-olds;
523 were three-year-olds; four-year-olds numbered
277; and there were 312 horses of the age of five

years and upwards. In the same publication the names of 108 trainers appear; and there are 33 officials who have received licenses to act in various capacities at race-meetings. During the season of 1890, 105 meetings were fixed to take place between the 24th March and the 22d November; and the names of 195 jockeys appear in the table of wina jockey in good practice are very great. The regulation fee is £5 for a winning mount and £3 for a losing one; but it is comparatively seldom that a jockey's remuneration is confined to the Bets are often made for him; minimum scale. retaining fees run to £1000 or more; presents are almost invariably given for successful riding; and in some cases the stakes of great races have been promised to jockeys if they win. It is not in England alone that horseracing flourishes. Many meetings are held in France, the chief races run there being the Derby, first run in 1836; the Oaks, in 1843; and the Grand Prix. Important meetings are held in Germany and at Vienna; while racing is becoming popular in Italy. Some of the great English races have been won by French horses. English races have been won by French horses, Thus, the Goodwood Cup was wou in 1853, 1855, 1857, and 1873 by Jouneuce, Baroncino, Monarque, and Flagcolet respectively. Mortemer won the Ascot Gold Cup in 1871, and Henry in the sneceeding year; while Boiard in 1874 and Verneuil in 1878 must be added to the list. In 1876 Chamant and Jongleur between them constant off the Middle Park, Plate Days. them earried off the Middle Park Plate, Dew-hurst Plate, and Criterion Stakes; Camelia won huist Plate, and Criteriou Stakes; Camelia won the One Thousand in 1876, and Chamaut the Two Thousand in 1877; Enguerrande and Camellia ran a dead-heat for the Oaks in 1876, and the St Leger fell to Rayon d'Or in 1879; and, in addition to these victories of French horses, Fille de l'Air carried off the Oaks in 1864, and Gladiateur, as already mentioned, won the Two Thousand, Derly, and St Leger in 1865. The long list of successes gained by the French horses in 1876, coupled with the fact that so few French races were once to the fact that so few French races were open to English horses, eansed the late Lord Falmonth to England noises, earlied the lackey ('lub in that year that he would bring forward a motion to the effect that no foreign horses should be allowed to compete in England until the bar to the admission of English abroad was removed. The idea, however, did not find favour, and the motion was allowed to drop. The successes of American horses date back to 1857, in which year Prioress won the Cesarewitch for Mr Teu Brocek, that gentleman's Starke being the winner of the Goodwood Stakes in 1859 and of the Goodwood Cup in 1861; Ivoquois was the Derby winner of 1881, and of the Prince of Wales's Stakes (Ascot) and of the St Leger as well; while Foxhall took the Cesarcwitch and Cambridgeshire in 1881, and the Aseot Cup in 1882. In more recent years Wallenstein and Passaic achieved some successes. Hungary has been represented on English racecourses by Kisber, the Derby winner of 1876, and by Kinesen, who won the Goodwood Cup in 1878. The entries for the the Goodwood Cup in 1878. The entries for the Derby of 1890 included two Australian colts sent over by the Hon. James White. Although trotting is the national sport in America, the galloping thoroughbred is somewhat growing in favour. Russia has its races; the turf exists as an institution in the colonies, at the Cape, and in India; and racing, for a few years prior to 1889, advanced so quickly into popular favour at Buenos Ayres that the export trade to that place was a very brisk one, and an English racing man or two and a trainer were tempted to go over to the Argentine Republic. The native trainers, however, were successful over the Englishmen. The rules of racing in England provide that in

each day's racing there shall be two races of 1 mile or npwards, not being selling races; and no race shall be run over a less distance than 5 furlongs. In the opinion of those who have the interests of the turf at heart, there are too many of what are colloquially known as '5-furlong scrambles,' which make shifty horses and bad jockeys. The rule as to the number of races in a day of 1 mile or npwards is of course strictly complied with; but it is at comparatively few meetings that a 2-mile race is witnessed. At Ascot there are several events run over 2 miles; the Gold Cup course is 2½ miles; and that for the Alexandra Plate 3 miles; while the Goodwood Cup distance is also 2½ miles, and the Cesarewitch is run over 2½ miles.

The weights carried by racehorses are assigned in various ways. In some races, like the Derby, Oaks, and St Leger, which are confined to horses of one age, all carry the same weight; but if, as in the Derby, both fillies and colts are eligible to compete, the fillies have a sex allowance of 3 lb. Next come the weight-for-age races, open to horses of different ages, in which ease horses of the same age carry the same weight, the younger ones less than older ones. Thirdly comes the handicap, which, owing to the field it opens to fraud, is said to have been responsible for many of the malpractices which occasionally take place in connection with the turf: it was brought into fashion by the promoters of race-meetings sometimes finding it difficult to provide sufficient sport for the spectators and the owners of horses. When racing was in its infancy all horses, which were, however, usually five or six years of age, curried the same weights, so that if a four-year-old happened to start he met maturer horses on disadvantageous terms; and, when a horse had made a name for himself, no others were entered against him. Weight-for-age races (in which horses of six years old and upwards give weight, according to a scale laid down, to younger competitors) and give-and-take plates were gradually introduced, the give-and-take plate being one in which a certain weight, say 9 stone, was assigned to horses of a certain size, hands, for example. Horses above that size carried 7 lb. extra for each inch, while those who fell short of that measurement were allowed 7 lb. for each inch below 14 hands. Handicaps were known in the 18th century, but it was not till about 1818 that they figured often in the programmes of race-meetings, have increased in number. Since then they

The handicaps at the meetings of which the Jockey Club stewards are also the stewards of the meeting are made by the official handicapper, who is a salaried official of the Jockey Club; but his services are retained for many other meetings, for which he obtains extra remuneration from those employing him. In racing it is songht to equalise the chances of the different horses by apportioning to each the weight which, in the opinion of the handicapper, will bring them together, his aim being to bring about a deadheat by all the horses competing. The conditions of a handicap are duly published, and the date at which the entries close is notified. The handicapper then proceeds to consider the powers of the horses, and assigns to each horse the weight he thinks it ought to carry, and in due course the several owners know the handicapper's estimation of their horses by the publication of the weights in the Racing Calendar. Those who think that the handicapper has entertained an exaggerated estimate of their horse's powers can save further cost in the way of forfeit by declining to accept; and then the next piece of intelligence published in the Sheet Calendar is the 'acceptances,' as they are

called—in other words, the names of the horses whose owners are primit fucie satisfied with their chances, though it by no means follows that all those that are 'left in,' as the phrase runs, will start for the race. It frequently happens that the horse to which is allotted the top weight is among the non-acceptors, not always because his owner thinks that the horse cannot give away the required weight, but because he is occasionally mawilling for him to carry so much for fear of breaking him down, of which there is obviously more chance under 9 stone than under 6 or 7 stone.

Moreover, the conditions of nearly every handicap provide that a horse winning a race after the publication of the weights shall carry a penalty, which must be added to the weight originally allotted by the handicapper; and the incurring of this penalty is often the reason of horses not starting. When the top weight or weights do not accept, the highest weight accepting is raised to that which was originally the maximum of the handicap, and then, assuming the maximum to have been 9 stone, a notice appears in the Calendar to the effect that, the highest weight accepting being 8 stone 4 lb. (or whatever the impost may have been), it has been raised to 9 stone, and the others in proportion. The minimum weight to be carried in a handicap or any other race is fixed by the rules of racing at 6 stone, and by the 27th rule the top weight to be allotted in a handicap shall not be less than 8 stone 12 lb. For a year or two prior to 1889 a rule was in force that apprentices who had not ridden three winners might claim a 5-lb. allowance so long as the weight to be carried did not fall short of the minimum weight permitted. The object of the rule was to encourage the curployment of lads not yet out of their time who gave promise of riding well; but after the regulation had been in force for a short time it was nrged that the 5-lb, allowance upset the work of the handienpper; so, when the rules of racing wore revised by the Jockey Club in 1889, the section authorising the apprentice allowance was excised.

To decide upon the weights horses shall carry is no easy task. The handicapper must be a regular attendant at race-meetings and able to form his own indement on what he sees; for the position a horse may occupy at the termination of a race is not necessarily any criterion of his true form. He may be out of condition; or, when his jockey finds he cannot win with him, a horse is almost invariably eased and finishes seventh or eighth when he might have been third or fourth; and the handicapper must also possess sufficient perception to see when an attempt is made to throw dust in his eyes. Even so astnte a man as the late Admiral Rous occasionally made mistakes; and whoever may for the time being occupy that difficult position must abandon all hope of pleasing everybody.

tion must abandon all hope of pleasing everybody.
See J. C. Whyte, History of the British Turf (2 vols. 1849); James Rice, History of the Turf (2 vols. 1879); W. Day, The Racchorse in Training (1880), and The Horse and how to Breed Him (1888); Hare, History of Neumarket (1884); History of Racing and Steeplechasing, 'Badminton' series, Duke of Beaufort, editor (1886); Touchstone, Pedigree, Description, and History of Celebrated English and French Racchorses, 1764 to 1837; an anonymous History of Racing (1862); Joseph Osborne, The Horse-breeder's Handbook (1881), and Companion to the Stud-book (Epsom, 1889); The General Stud-book, published every five years (vol. xvi. 1889); Weatherleys' Portraits of Celebrated Racchorses (4 vols. 1887); Taunton, Portraits of Udebrated Racchorses (4 vols. 1889); Weatherleys' yearly Rucing Calendar; Ruff's Guide to the Turf. See also Steeplechase, Trotting, Berting.

Horse-radish (Cochlearia Armoracia), a perennial herbaceous plant, belonging to the natural

order Crucifers and to the same gems as senrygrass. It possesses the same antiscorbutic properties as the latter, but is better known popularly on account of its use as a condiment with roastbeef. It is highly stimulant, exciting the stomach

Roots of Florse-radish (a) and Monkshood (b).

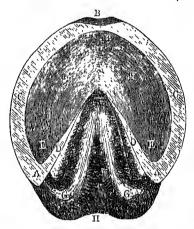
and promoting the secretions, particu-larly that of urine. Its virtues depend upon a volatile oil similar to oil of . The oil mustard. contains about 30 per cent. of sulphur to its other elements, and is recognised as one of the most powerful antiscorbutics known. Horse-radish is a native of south-eastern Europe, has long been cultivated in British gardens, and is naturalised in some parts of England and Ireland. For its perfect cultivation it requires very deeply-worked soil from which it is soil, from which it is vory difficult to eradicate, as the smallest hit of roat not re-moved will emit a bnd. Cases of fatal paisoning have several times occurred through the ignorant mistaking

the roots of Monkshood (q.v.) for those of horseradish. The former are powerfully poisonous; but
there is no resemblance between the two plants in
any respect. The roots of horse-radish are long,
tapering, cylindrical, with a cream-coloured skin.
Those of monkshood are short, irregular in shape,
blant at both ends, and have a nut-brown skin.
The root-leaves of horse-radish are from 9 to 18 inches
long by from 4 to 6 inches broad, entire, but often
toothed on the margins. Those of monkshood are
roundish in outline, divided to the base into five to
seven deeply-ent, linear, finely-painted segments.
The flowers of horse-radish, which are spaningly
produced in Britain or the United States, are horno
on branching stems about 2 feet high, and composed of four pure white spreading petals. Monkshood hears its flowers freely in handsome racemes,
at the extremities of usually simple or unbranched
stems; the colour is deep blue, and the unopened
flower strougly resembles a helmet or hood.

Horse-radish Tree. See Ben (Oil of).

Horseshoeing. In olden times horses generally went unshed, as they now do in many eastern countries; but our macadantised roads and paved streets, fast paces and heavy loads, would speedily went away the stoutest hoofs, and a rim of iron has accordingly been loug in use as a protection. In style and pattern the horse's shoe varies almost as much as his master's boot, and like it, when badly made or unskilfully fitted, produces serious inconvenience, and even leads to accidents and diseases. When the feet are strong and properly managed nothing is better than a plain shoe of tolerably uniform breadth and thickness, earefully fashioned to the shape of the foot. But many good authorities prefer what is called a scated shoe, which has a level part for the crust to

rest upon, and within that the inner balf of the shoe towards the sole surface is bevelled off. This seated shoe is thus wider than the plain shoe, and hence affords greater protection for a weak or flat sole. For faulty or diseased feet special forms of shoes are made. In all healthy feet the shoe should be fitted to the foot, and not, as is commonly done, the foot cut to fit the shoe. Another frequent error must be avoided—keeping the shoe short and spare at the heels. For roadsters the toe of the fore-shoes should be slightly turned up, which greatly obviates tripping. The hind-shoes are generally thickened and sometimes turned down at the heels. The number of nails required must vary somewhat with the weight of the shoe and the soundness of the hom; five is the minimum, nine the maximum. It is important, however, that the shoes he firmly held on by as few nails as possible. In a saddle-horse with sound feet three on the outside and two on the inside should suffice to hold a well-fitted shoe. Horses for heavy daught



A sound Fore-foot prepared for the Shoe:

A, A, the heels of the crust; B, the toe cut out to receive the clip; C, C, the quarters of the crust; D, D, the bars as they should be left, with the full flog between them; E, E, the augles between the heels and bars, where come appear; F, P, the concave surface of the toe; G, G, the bulbous heels; H, the cleft.

are generally shod in Scotland with tips and heels, which afford increased firmness of tread and greater power, especially when dragging heavy loads. preserve the foot in a sound state the shoes should be removed every mouth. When the shoe is care-fully taken off, the wall-surface on which it has rested should be rasped, to remove any ragged edges and any portions of adhering nails. Having for a month been protected from the wear to which the exposed portions of the foot are subjected, it will prohably have grown considerably, and in a stout hoof will require to be cut down with the drawing-knife, especially towards the toe. Except in very strong feet and in farm-houses working on soft land, the surface of the sole uncovered by the shoc seldom requires to be cut. It is the natural protection of the internal delicate parts, and must be preferable to the leather and pads often artificially substituted for it. The bars must likewise remain untouched, for they are of great service in supporting weight; whilst the tough, elastic frog must be serupulously preserved from the destructive attacks of the knife, and allowed uninjured to fulfil its functions as an insensible pad, obviating concussion, and supporting weight. When the shoe is put on and the nails well driven home, they should be broken off about an eighth or even a sixteenth of an inch from the crust, and

hammered well down into it. This obviously gives the shoe a much firmer hold than the usual practice of twisting off the projecting nail close to the crust, and afterwards rasping down any asperities that still remain. When the shoe is firmly clinched the rasp may be very lightly run round the lower margin of the crust just where it meets the shoe, to smooth down any irregularities; but all further use of the rasp must be interdicted. The clinched nails if touched will only have their firm hold weakened; nor must the upper portions of the crust, which blacksmiths are so tond of turning out rasped and whitened, be thus senselessly deprived of those external unctuous secretions which render the mirasped foot so tough and sound and so free from sandcracks. The hoof cannot be too dry and tough. From time to time various attempts have been made to fix shoes to horses' feet without nails; and a shoe has been invented, which is said to have answered the purpose; but in the opinion of many the system is still immature, and requires to be more extensively tested. An interesting exhibition of horseshoes, ancient and modern, was held in London in March 1890.

See Notes on the Shoring of Horses, by Lient.col. Fitzwygram; a paper on 'Horseshooing' by Miles, in the Journal of the Royal Agri. Soc. (reprinted by Murray); and Williams' Veterinary Surgery.

Horsetails (Equiscium), a genus of herhaceous plants which in itself constitutes the singular natural order Equisciance. The family is distinguished from all others by the leafless, articulated, and whorled stems and branches, which in structure and character closely resemble some of the larger fossil plants now extinct. They are separated from all other plants also by their fructification, which is an ovoid or oblong terminal cone-like spike, consisting of several whorls of peltate, shield-shaped, short-stalked brown or black scales, under each of which are six or seven eapsules filled with minute spores, and opening on the inner side. Under the uncroscope there will be seen attached to the base of each spore four thread-like filaments, somewhat club-shaped at the apex, rolled spirally round the spore when moist, but uncoiling clastically when dry.

coiling clastically when dry.

The species of housetail are few in number, although widely diffused in the temperate and colder regions of the northern hemisphere, becoming rare in the tropics. Nine species occur in Britain, usually in moist or marshy places, but they adapt themselves easily to a great variety of stations, and are almost incradicable where they obtain a footing in either field or garden. Diurette and other medicinal properties have been ascribed to them, lint apparently on slight grounds. They all contain a large quantity of silica in the enticle of their stems, which has rendered them useful in polishing metals, marbles, ivory, cabinet-work, &c.

E. hyemade is the most favoured species for these purposes, and it is imported in considerable quantity from Holland under the name Dutch Rushes.

Horsham, a market-town of Snssex, near the source of the Arun, 26 miles NNW. of Brighton and 35 SSW. of London. The noble parish church, Early English in style, was restored in 1865; other buildings are the corn exchange (1766), graumar school (1540; rebuilt 1840-57), &c. Brewing, tanning, iron-founding, and coach-building are carried on. Horsham returned two members of parliament from the 14th century till 1832, and one down till 1885. East of the town is St Leonard's Forest, and 2 miles NW. Field Place, Shelley's birthplace. Pop. (1851) 5947; (1881) 9552. See Histories of Hursham by Howard Dudley (1836) and an anonymons writer (1868).

Horsley, Samuel, an English prelate, was the son of a clergyman, and was born at London in 1733. He was educated at Westminster School and Trinity Hall, Cambridge; and in 1759 succeeded his father as rector of Newington, in Surrey -a living which he held for thirty four years, though he also enjoyed in the interval many other preferments, including the archdeaconry of St Albans (1781). In 1767 Horsley was elected a Fellow of the Royal Society; in 1774 he published his Remarks on the Observations made in the late Voyage towards the North Pole, for determining the Acceleration of the Pendulum; and two years afterwards he issued proposals for a complete edition of the works of Sir Isaac Newton, which, however, did not make its appearance till 1785. But the grand event in his career was the controversy with Priestley, in which he displayed remarkable learning and acuteness, somewhat marred by intolerance and contemptuous bitterness. work that excited the controversy was Dr Priest-ley's History of the Corruptions of Christianity, among which corruptions was included the orthodox doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of his auchdeacomy, May 22, 1783. Priestley replied the same year; and in 1784 Horsley retorted in seventeen Letters. These were, in return, met by a new series from Priestley. After a silence of eighteen months Horsley again replied, and in 1789 collected and published the whole that he had written on the subject. His services were rewarded with the bishopric of St Davids in 1788, with that of Rochester in 1793, and with that of St Asaph in 1802. He died at Brighton, October 4, 1806. As a bishop he was liberal to the clergy and humane to the poor of his diocese, withal vigilant and even strict in the discharge of his episcopal duties. Horsley's works, besides those already mentioned, consist of sermons, works on Hosea, the Psalms, and on biblical criticism, an edition of part of Enclid, and some disquisitions on classical subjects. A collected edition of his theological works was published by Longman (6 vols. 1845).

Mortense, Queen. See Bonaparte, Vol. II. p. 288,

Hortensius, Quintus, Roman orator, was born in 114, and died in 50 B.C., having nineteen years before held the consulship. A master of the florid or 'Asiatic' style, he largely devoted himself to the defence of aristocratic offenders, such as Verres. His only rival was Cicero, but his countless speeches are known to us only by the merest fragments.

Horticulture. See Gardening. Hortus Siccus. See Herbarium.

Horns, an Egyptian deity, whose name, Har, means 'the day' or 'the sun's path,' and is generally written in hieroglyphics by the sparrow-hawk, which was sacred to him. See Egypt.

Horvath, Michael, Hungarian historian, was horn at Szentes, in the county of Csongrad, 20th October 1809. In 1844 he became professor of the Hungarian Language and Literature in Vienna, and four years later Bishop of Csanad. He took an active part in the revolutionary war, holding the appointment of minister of 'culture' and public instruction. The defeat of the Hungarians drove him into exile. In his absence he was condemned to death, but was allowed to return home under the amnesty of 1867. He died at Carlsbad, 19th August 1878. Of several bistorical works which he wrote three deserve special mention: History of Hungary to 1823 (4 vols. 1842-46), and its continuations, Twenty-five Years of Hungarian History,

1823-48 (2 vols. 1863), and History of the War of Independence in Hungary (3 vols. 1865).

Hosanna, used as an expression of praise, is ally a prayer—'Save, we pray' (through Gr. ically a prayer—'Save, we pray' hōsanna, from Heb. hoshidhnud).

Hosea (Heh. Hôshê'a ; LXX. Osêc ; Vulg. Osec), the first in order of the twelve minor prophets, is nowhere mentioned in the Old Testament except in the book which bears his name. From this source we learn that he was a citizen of the kingdom of Israel (see i. 2, where 'the land' is plainly the northern kingdom, and vii. 5, where 'our king' is the king of Samaria, that his father's name was Beeri, and that he prophesied during, and apparently also after, the reign of Jeroboam II.—i.e. from about the middle of the 8th century B.C. The fourteen chapters which preserve to us all that we know of what must have been a to us all that we know of what must have been a long period of prophetic activity may plausibly be believed to have been edited by binuself and given to the world in writing towards the close of his life. The first three derive a special interest from thoir autobiographical element. The remaining eleven consist of a series of prophecies, mostly of a threatening character, relating to the king-dom of Israel. The details of these present many exegotical difficulties, and it is impossible to de-termine with any certainty what may have been termine with any certainty what may have been the precise circumstances under which each oracle was originally delivered. Some relate to the still outwardly prosperous times of Jeroboam II., and others, most likely, to the troubled years that inmediately followed. They point generally to an exceedingly dissolute internal condition of society, which ultimately drove the prophet to the verge of which intrimitery arove the prophet to the verge of despair, and out of which he saw no escape save in the destruction of the kingdom, to be followed by a linal restoration brought about in some unexplained way through the sovereign love and merey of Jehoval. The question of greatest interest to interpreters of the Book of Hosea is that connected with the narrative of the first three chapters, in which the prophet relates how the experiences of his married life furnished him with his prophetic message. In the opening words we read of his marriage to Courer bath-Diblaiu, by whom he had marriage to comer nati-Diniatu, by whom he had three children to whom he gave the significant names, Jezreel ('Jehovah shall sow'), Lo Ruhamah ('not pitied'), and Lo Ammi ('not my people'). Her profligate conduct after marriage led to a separation, but, in obedience to a divine eall, he took her back; and in the ultimate victory of marital love over a wife's infidelity he saw the token and the promise of the final triumph of token and the promise of the mual frumph or Jehovah's grace over Israel's sin. According to the modern view, first suggested by Ewald, further elaborated by Wellhausen (in 4th ed. of Bleek's Einleitung) and Robertson Smith, and now adopted by most scholars, Hosea, i. 2, is to be interpreted in the light of the pagenta as Jer vyvii, 8 where the light of such a passage as Jer. xxxii. 8, where we have a clear instance of recognition of a divine command only after the deed has been accomplished, and there is therefore no necessity for supposing that Hosea was aware of the profligate character of Gomer bath-Diblaim when he married her, or indeed that her profligacy had declared itself at that time. Earlier interpreters either took the passage literally and argued that a marriage which otherwise would have been contrary to all sound moral feeling was justified by a divine command, and that the repulsive elements in it magnified the obedience of the prophet; or they treated it as an allegory, without much attempt to explain how a proceeding which would be objectionable in fact ceases to be so in the realiss of fiction,

For a full discussion of Hosea and his prophecies, see W. R. Smith, Prophets of Israel (1882). There are

special commentaries on the book by Simson (Hamburg and Gotha, 1851), Winsohe (Leip. 1868), Nowack (Berlin, 1880), and Cheyne (new ed. Cambridge, 1889). See also the commentaries on the minor prophets generally—Ewald (*Propheten*, vol. i.; Eng. trans. 1876), Hitzig, Keil (Eng. trans. 1868), Reuss (*Bible*, 1876), Puscy (1860); and, for homiletical purposes, Schmoller in Lange's *Biblework* (Eng. trans. 1874).

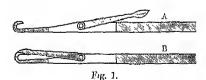
Hoshangabad, chief town of Hoshangabad district (area, 4437 sq. m.; pop. in 1881, 488,787), in the Central Provinces of India, stands on the south bank of the Nerbudda River and on the Bhopal State Railway, 40 miles SSE, from Bhopal. It does a lively business in English piece-goods, cotton, grain, &c. It has been in British hands since 1817. Pop. (1877) 11,613; (1881) 15,863.

Hoshiarpur, capital of a district in Punjab, near the foot of the Siwalik Hills, 90 miles E. from

Pop. (1881) 21,363. Lahore.

Mosiery, in its most limited sense, refers to the manufacture of stockings (hose); but in its more general application it comprises all knitted goods, whether made by hand or by machinery. The use of hose or stockings originated in the cold countries of the north, and probably the first were made of skins, and subsequently of cloth. Illuminations in ancient MSS, show that these nether Normans. The art of knitting was invented (it is supposed in Scotland) in the 15th century. Certain supposed in Scotland) in the 15th century. Certain it is that knitted stockings found their way to France from Scotland, and led to the establishment of a guild of stocking-knitters, who chose for their patron saint St Fiacre of Scotland (really an Irish monk of the 6th century, the patron of gardeners). In 1589 William Lee, of Woodborough, Nottinghamshire, entirely altered the hosiery trade by inventing the knitting-frame, or stocking-frame; and, although he did not live to enjoy much benefit himself from it, it soon became a very important feeder to the commerce of Great a very important feeder to the commerce of Great Britain.

The first improvement of marked importance on Lee's machino was the ribbing apparatus invented by Jedediah Strutt in 1758. This consisted in adding a second series of needles, with an arrangement for working them, to Lee's machine, which could only make a plain, not a ribbed, web. Sir Mare I. Branel invented, in 1816, a circular knitting-frame, to which he gave the name of tricoteur. This produced a tubular web, and was a meritorious machine, but it did not come much into use till Brussels. His further madilication of it in 1847 caused it to be widely adopted, and it has received various improvements since. Several important improvements in hosicry machines are due to Townsend, chief among them being a tumbler or latch needle, patented by him in 1858, which is now largely employed in certain kinds of knittingmachines, especially those for fancy hosicry and for domestic use. Fig. 1 shows two views of this

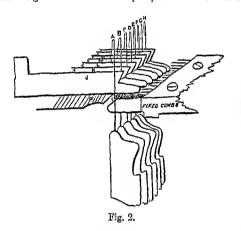


A represents it with the hinged latch or tongue folded back on the stalk so that the hook may catch the thread. B shows the latch closed on the point of the hook so that it may freely pass a new loop of thread through the last-formed loop.
The latel is moved by the loops of thread or yarn during the action of the machine. The modern

form of Lee's needle is shown in the other figmes. The most prominent name among the improvers of hosiery machines in comparatively recent times is that of William Cotton of Loughborough. Between 1851 and 1869 he devised arrangements both for narrowing and widening the fabrie, and in coninnetion with Attenborough made a number of alterations for the better on the general arrangements of the parts of the knitting-frame. Some of the best hosiery machines driven by steam-power now in use are on Cotton's system.

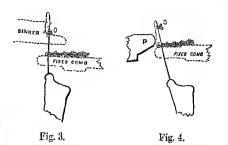
The names of two Americans appear in the list of those who have contributed to the advancement of knicting machinery. In 1858 an English patent was taken out by W. C. Gist for a circular machine, which, by using several feeders instead of one, enabled striped work with as many as sixteen eolours to be made at once. Another English patent was taken out in 1877 by Almet Reid for a circular knitting-frame for making automatically articles of many different shapes, in which the loops or stitches are so locked together as not to unravel when cut or torn.

A knitted fabric of one colour consists of one continuous thread instead of a warp and a weft thread as in weaving, and the knitting done by a machine is exactly of the same nature as that done by hand. With the aid of the accompanying illustrations a brief description will suffice to explain the principle on which a knitting-machine or stocking-frame works. A perspective sketch of a



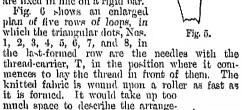
part of a division of the machine is given in fig. 2. The hooked needles (Lee's) are shown at A, B, C, D, E. The 'sinkers,' J, K, L, M, N, are thin plates of steel, which have a backward and forward motion, each sinker passing between two needles. When the sinkers are moved to the left of their position in the figure a space occurs between them and the needles, along which the thread or yarn is laid. As the thread proceeds along the face of the needles the sinkers one by one advance and thrust the thread between them, thus forming a row of loops, after which the sinkers retire.

All the needles act simultaneously and in the same way; but to make the action of the machine more easily understood, figs. 3, 4, and 5 show the movements of a single needle. Fig. 3 represents, in side elevation, the position of a sinker, a comb, and a needle, at the moment when the needle has sink between the sinkers, till the newly-formed loop of thread, O, enters the hooked portion or open eye. The needle, continuing its descent, is rocked forward till, as shown in fig. 4, the 'heard' of the hook eomes against the 'presser bar' P, which presses for a moment the point of the beard into a tracky on the stem and so forme a classel eve groove on the stem, and so forms a closed eye round the loop O. The needle, in further descending, pulls this loop through the last-formed loop



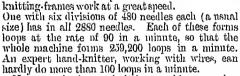
of the knitted falmic. It is in this closing of the hook to enable the one loop to be drawn through the other that the great ingenuity of Lec's invention lies. Fig. 5 shows the new loop just pulled

through, and then the needle, rocking forward in the direction of the arrow, ascends, while the loop slips down its stem. The next loop is pulled through in the same way. The explanation just given of the motion of one needle anplies to all the needles, as they are fixed in line on a rigid bar.



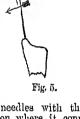
ment for narrowing or widening the fabric, to bring it to the shape of a stocking for example. This is called 'fashioning.' The web, however, is often not shaped in the process of knitting, but eut, when finished, into any form required, as is done with ordinary cloth.

Some of the most improved modern



Numerous hosiery or knitting machines, varying much in their details, are now made both for factory work and for donestic use. In the volumes for 1886 and 1889 of the Textile Manufacturer, published at Manchester, several of the best of these are illustrated and described. To the pages of that journal we are indebted for the diagrams given in this article. For the history of the knitting-frame, see Felkin's Machine-wrought Hosiery and Lace (1867).

Nottingham and Leicester, especially the former, are the chief centres of the hosiery manufacture in the United Kingdom, but it extends into the adjoining counties. It is also extensively carried on in France, Germany, and other continental countries. In the United States hosiery factories are in active operation in New York, and in five or six neighbouring states. The materials used for hosiery are cotton, wool, and silk; and the number of different kinds of articles made, including stockings, gloves, shawls, hats, bonnets, and



FIXED COME



Fig. 6.

all kinds of underelothing, amounts to thousands. The result of recent improvements in the machinery for the manufacture of hosiery is shown by the fact that in 1854 it cost fully six shillings to knit a dozen pairs of stockings by the hand knitting-frame then in use; whereas the cost at the present time by power knitting-machines does not exceed one shilling and tenpence per dozen pairs.

Hospice, the name given to the pions establishments for sheltering travellers, maintained by monastic persons, usually in connection with monasteries. One of the best known in inhospitable Bernard (see ST Bernard), of which mention is made as early as 1125. Travellers are lodged and hoarded gratuitonsly, but those who can, deposit a suitable present in the alms-box. Similar established. lishments are found on the Simplon, the Little St Bernard, and the Bechina.

Hospitallers, in the Roman Catholic Church, are charitable brotherhoods, founded for the care of the poor and of the sick in hospitals. They follow for the most part the rule of St Angustine, and for the most part the rule of St Angustine, and add to the ordinary vaws of poverty, chastity, and obedience, that of self-dedication to the particular work of their order. The Knights of St John of Jerusalem (see below) and the Tentonic Knights (q.v.) were both originally hospitallers. The Knights Hospitallers of the Holy Spirit were founded at Montpellier in 1198 by Gay of Montpellier, and the hospitallers of One Lady of Christian Charity at Paris in the end of the 13th century by Charity at Paris in the end of the 13th century by Guy de Joinville. And numerous similar orders have been established since then.

THE ORDER OF THE KNIGHTS OF ST JOHN OF JERUSALEM, otherwise called the Knights of Rhodes, and afterwards of Malta, a celebrated military and religious order of the middle ages, originated about 1048 in a hospital, dedicated to St John the Baptist, which some merchants of Amalfi built at Jerusalem for the care and cure of pilgrims to the Holy Sepulchre. After the conquest of Jerusalem by the crusaders under Godfrey of Bonillon in 1099, the hospital servants were joined by many from the Christian army, who resolved to devote themselves to the service of the poor and sick pilgrims. Gerard, the first rector of the hospital, formed them into a regularly-constituted religious body, bound by the vows of poverty, chastity, and obedience, and subject to the jurisdiction of the Patriarch of Jerusalem. Pope Pascal II. gave his sanction to their institution as an order in 1113. Raymond du Puy, the successor of Gerard, extended the activity of the order by yeld-line it, appendix the activity of the order by pledging its members to protect pilgrins on the rouls from the sea to the Holy City. Soon afterwards the order became predominantly military: the Hospitallers were sworn to defend the Holy Sepulchre to the last drop of their blood, and to make war upon the infidels wherever they should meet them. Having become military as well as religious, the order was recruited by persons of high rank and influence, and wealth flowed in from all quarters. Various hospices, called commanderies, were established in the maritime towns of Enrope as restingplaces for pilgrims, who were there provided with the means of setting out for Palestine. These branch establishments also collected the revenues of the order, and received candidates for admission to its ranks. After the conquest of Jernsalem by Saladin the Hospitallers established themselves at Acre in 1191. Soon afterwards a bitter rivalry sprang up between them and the Knights Templars, which finally set them in battle array one against the other in 1259, when victory inclined to the former. The Hospitallers clung with desperation to Acre, the last Christian stronghold

in Palestine; but after a terrible siege by the to Cyprus (1291), where the king of the island gave them an asylum for some years.

In 1185 Frederick Barbarossa took the order under the protection of the empire. In the following century the title of 'master' was changed by Pope Clement IV. into 'grand-master.' The brethren consisted of three classes, knights, chaplains, and serving brothers, these last being fighting squires, who followed the knights in their expeditions. The order was in the 12th century divided into eight 'languages'—Provence, Anvergue, France, Italy, Aragon, England, Germany, and Castile. Each 'hunguage' embraced several grand-priories, and under these again were a munber of commanderies.

In 1310 the knights, under the grand-master Fulk de Villaret, in conjunction with a party of crusaders from Italy, captured Rhodes and seven adjacent islands from the Greek and Moslem pirates, and earried on from thence for more than two hundred years a successful war against the Turks. During this period the Hospitallers were the owners of nearly 19,000 manors in Europe, and to these ot hearly 19,000 manors in Europe, and to these 9000 more were added on the suppression of the Knights Templars in 1312. In 1523 they were compelled to surrender Rhodes to Sultan Solyman, and retired to Candia (Crete). In 1530 Charles V. assigned them the island of Malta, with Tripoli and Gozo. Tripoli was surrendered in 1551 to the corsair Dragut, who in 1565 laid siege to Malta, which the Hospitallers had strongly fortified. Dragut was beaten off at the end of four months with the loss of 25,000 men. The knights contimed for some time to be a powerful bulwark against the Turks; but after the Reformation a moral degeneracy overspread the order, and it rapidly declined in political importance. In 1798, through the treachery of some French knights and the weakness of the last grand-master, Hompesch, Malta was surrended to the French. The lands still remaining to the order were about this time confiscated in almost all the European states; but, though extinct as a sovereign body, certain branches of the order, with more or less just claims to legitimate succession, have continued during the 19th century to drag on a lingering existence in Italy, France, Spain, England, and Germany. After 1801 the office of grand-master was not filled up, till in 1879 the pope appointed a grand-master for the Italian and Bohemian 'languages.' In their military capacity the Hospitallers were red surecasts over their armon. The badge worn by all the knights was a Maltese cross, enamolled white and edged with gold. The motto of the order was 'Pro fide,' with the later addition of Pro utilitate hominum.

There are two modern associations which ascribe their origin to the original order—the Brandenburg 'Johanniterorden' and the English order of the Knights of St John. The former, a direct descendant of the German 'language' of the old legitimate order, was reorganised in 1853, and did good service. order, was reorganised in 1833, and did good service in the campaigns of 1866 and 1870. In England the property of the old order was confiscated in the lirst year of Elizabeth's reign, and the order itself was dissolved and declared to be illegal by Henry VIII. in 1541. Nevertheless the 'language' of England was resuscitated in 1827; the revived society has its headquarters at St John's Cate, Clerkenwell, London. Its efforts are purely philanthropic; it distributes charity to convalescents who have just left hospital, maintains cottage hospitals have just left hospital, maintains cottage hospitals and convalescent homes in the country, and an ophthalmic bospital at Jernsalem. It has founded the street ambulance system, and was chiefly concerned in the origination of the Red Cross Society.

See Histories of the order by Bosio, Del Pozzo, Vertot

(Eng. 1728), Taaffe (1852), Porter (1883), De Salles (1889); and Delaville de Roux's Les Archices, la Bibliothèque, et la Trésor de l'Ordre de St-Jean à Malte

Hospitals are so called from the medieval hospital, or more properly the class of hospitals established very generally for the reception and relief of lepers, whose malady was one of the scourges of Enrope. These leper haspitals were very commonly in England and in Scotland called 'Spitals;' hence the frequency of such names of places as Spital, Spitalfields, &c. The leper hospitals and other kinds of the old hospitia disappeared with the improvement of society, and substitutes for them on a broader scale began to be established in the modern form of hospitals. Of public establishments under this general designa-tion there are now, as is commonly known, three distinct classes—hospitals for the reception and treatment of the sick and linet, hospitals for the board and education of children, and hospitals for the reception and permanent board of poor old persons of both sexes. As in the present work the more remarkable hospitals receive some notice under their respective heads, we need here only offer a

few general observations.

Hospitals for the sick and hurt are in some parts of England and Scatland termed Infirmaries. Under whatever designation, institutions of this kind are now established in all parts of the civilised world. They are supported in most cases on a principle of charity, but in some special instances from the funds of the state or the civic numicipalities. The primary or more important object of all such institutions is to mitigate bodily suffering, whether that arises from natural or accidental causes, in which respect they are indispensable as a refuge to all who are unable to pay for private medical or surgical aid, or as a convenient means of succour on emergencies to persons of every rank and degree of opulence. While such is the main object of these benevolent institutions, they are also serviceable as schools for medicine and surgery; as such, no university, at which these and kindred branches of learning are taught, can be said to be complete without the adjunct of a well-organised hospital, where professors can practically educate their pupils by pointing out varieties of disease and injuries, and exemplifying methods of treatment. Hence the lest specimens of hospitals are found in Hence the lest specimens of hospitals are found in university towns—as in London, Paris, Edinburgh, and some other cities funed as schools of medicine and surgery. The older of the London hospitals are St Thomas's (1553), St Bartholomew's (1546), and Bedlam or Bethlehem (1547), to which may be addled the Westminster (1719), Gny's (1725), the Lock (1746), St George's (1733), the London (1740), the Middlesex (1745), and University College (1833). A considerable accession to the number took place in the reign of George II., when society became alive to the value of such institutions. It became alive to the value of such institutions. It was at this period that the Royal Infirmary of Edinburgh was established (1736). The antiquity of British hospitals sinks into insignificance in comparison with that of some institutions of this kind on the Continent. The Hôtel Dieu in Paris, which is alleged to be the most ancient hospital in Europe, was founded in the 7th century, and, long known as the Maison Dien, received the benefactions of successive sovereigns.

In London, Paris, and other large scats of popula-tion, besides the general hospitals, there are now lying-in hospitals, ophthalmic hospitals, consumptive hospitals, children's hospitals, &c.—each with its peculiar accommodation and staff of officials. Convalescent Hospitals (q.v.) are a valuable adjunct to ordinary hospitals for the sick. Independently of these there are hospitals for the

treatment of mental maladies, of which Bethlehem and St Luke's in London, and the establishments in Paris, known as Hospices, are examples. To this class of institutions belong Lunatic Asylums (q.v.), also asylums for the reception and treatment of naturally imbecile children; these last, though in operation for some time in France and Switzerland, being but of recent establishment in Great Britain. To these must be added the isola-tion hospitals for the treatment of smallpox, scarlet-fever, and other forms of infectious diseases, which have been established in recent years by energetic sanitary authority out of the Besides these institutions under civil administration are those hospitals which are maintained by the English, Freuch, and other governments for the military and naval services. United States, where every medical college has its own hospital, or the right to teach in the wards of public institutions, there are also many hospitals or asylums for inebriates (see INEBRIATES), for opinm-users, and those addicted to the use of other nareotics (see also FOUNDLING HOSPITALS, Ambulance).

Until the middle of the 19th century the organisation and management of hospitals and the nursing of the sick in Britain and in most parts extremely defective. Public opinion was then aroused on the question, and certain principles were laid down an hospital construction and hospital co pitul nursing which have been recognised and adopted to a greater or less extent since that time. These principles may be briefly summed up as follows under the three heads: (1) Construction, (2) Administration (2) Description

(2) Administration, (3) Nursing.

(1) Construction.—The first object is to obtain pure air in and around the building. The purity of air around will depend upon the site. The will should be also aid dwy the position should soil should be clean and dry; the position should admit of free circulation of air untainted by surrounding sources of impurity or damp. The number of sick who can be placed on a given site depends on the form of the buildings in which they are to be placed. It is now considered that more than 100 tutionts should never be under the course to be indeed. It is now considered that indeed than 100 patients should never be under the same roof. And less is better. This has led to the pavilion form of building being adopted—blocks connected by corridors. Two floors only of patients' wards are admissible, but hospitals with only one floor for the ward accommodation are now univer-sally recognised as best. More than three is insanitary. Hospital buildings consist (a) of the wards for the reception of the sick, and their appurtenances; these necessarily form the basis of the design; subsidiary to these are the operating theatre, &c.; and where there is a medical school instructional accessories have to be provided. (b) The buildings for administration—i.e. for lodging the staff, the kitchen, stores, and dispensary, should be always subordinate to the question of the accommodation for sick. In some hospitals extra outpatients' departments are provided. These should never be placed under the same roof with the wards for the sick.

(a) The first principle of the ward unit is that the ward and ward offices should be self-contained within one door commanded by the head-nurse's room, so that at any moment she may know where every patient is. The size of the wards has to be somewhat guided by economy of administration, so as to enable the largest number of patients to be nursed by a given number of nurses. The limit of the ward is practically the number who can be efficiently nursed under one head-nurse. Each efficiently nursed under one head-nurse. Each ward may have subsidiary to it one or two small

wards for bad cases.

The ward appurtenances consist partly of nursing

accommodation and partly of offices for patients. The nursing accommodation includes a bedroom for the head-nurse; a serving room in which food can be warmed, drinks and extra diets made, and linen kept and aired, hot water obtained, poultiees, &c. made; also a nurses' water-closet near. The head-nurse's room should be so placed as to enable the nurse to exercise constant supervision over the ward and the patients. The offices for patients comprise a lavatory for the patients, a bath-room with a movable bath, which bath-room and lavatory should be large enough for minor surgical operations, and water-closets in the proportion of about 3 to 10 per cent, of the number of patients—the general hospital for acute eases, mostly in bed, requiring the lesser number—one or more slop sinks, a place for keeping ejecta of patients for medical inspection. These appurtenances should be cut off from the ward by ventilated lobbies, and should be always warmed and ventilated independently of the ward.

The form of the ward should be such as to enable the air to be renewed with the greatest facility. Experience in this climate shows that the windows are the best appliance for complete renovation of the air. For this purpose they should be on opposite sides of the ward, and the wards should not exceed from 20 to 28 feet in width. There should not be above two rows of beds between the windows. The rectangular form enables these conditions to be best fulfilled in the case of large wards. Where the wards are not intended to contain more than from four to eight patients a circular form of ward has been in some cases found mobijectionable; but as it is a principal object in hospital construction to provide a large wall space in proportion to the floor and cubic space per bed in the wards, and as the rectangular form affords the largest, and the circular form the smallest wall space in proportion to the area of the ward, it is evident that the rectangular form is that hest adapted to sanitary requirements.

(b) The subsidiary accommodation should be so arranged as not to interfere with the purity of air in or around the wards. The fewer places in and about the ward the better. Not only the best arrangements, but what use will be made of them, has to be considered. The sleeping accommodation for nurses should be so placed as to ensure purity of air in the domitories, and complete quiet for the night-nurses to sleep by day.

(2) Administration is intended to enforce economy so far as it is consistent with the provision of requirements for the sick. It is usually in the hands of a governing body, which issues all regulations after consultation with professional advisers; it controls the expenditure and raises the funds to support the hospital. The governing body acts through its treasurer, secretary, and steward for the general discipline and control of expenditure. The well-being and cure of the patients is directed by the professional staff of medical officers, which consists of visiting physicians and surgeous and of resident medical officers, who control the treatment of the patients under their direction and in the absence of the visiting medical officers. The nursing of the sick is under a trained matron or lady superintendent, who should be the head of all the women employed in the hospital.

(3) Nursing the sick and injured is performed usually by women under scientific heads—physicians and surgeons. Nursing is putting us in the best possible conditions for nature to restore or to preserve health—to prevent or to cure disease or injury. The physician or surgeon prescribes these conditions—the nurse carries then out. Health is not only to be well, but to be able to use well every power we have to use. Sickness or disease

is nature's way of getting rid of the effects of conditions which have interfered with health. It is nature's attempt to eme—we have to help her. Partly, perhaps mainly, upon unusing must depend whether nature succeeds or fails in her attempt to cure by sickness. Nursing is therefore to help the patient to live. Nursing is an art, and an art requiring an organised practical and scientific training. For nursing is the skilled servant of medicine, surgery, and hygiene.

Nursing proper means, besides giving the medi-

Nursing proper means, besides giving the medicines and stimulants prescribed, or applying the surgical dressings and other remedies ordered, (1) the providing and the proper use of fresh air, especially at night—i.e. ventilation—and of warnth or coolness; (2) the securing the health of the sicknoom or ward, which includes light, eleanliness of floors and walls, of bed, hedding, and intensils; (3) personal cleanliness of patient and of nurse, quiet, variety, and cheerfulness; (4) the administering and sometimes preparation of diet (food and drink); (5) the application of remedies; in other words, all that is wanted to enable nature to set up her restorative processes, to expel the introder disturbing her rules of health and life. For it is nature that cures: not the physician or nurse. See Nursing.

Poor-law Infirmaries,—Since 1870 poor-law or parish infirmaries for sick and infirm, who used to be harboured (not treated) in workhouses and unused by paupers, have been built in London and the United Kingdom; these fulfil also more or less the requisites of good hospital construction, and are served by trained muses. Some difference exists between the essentials for general hospitals and for poor-law infirmaries—the latter having no medical schools, no visiting or resident medical officers, except the resident medical superintendent and his assistant, no accidents or operations. The large majority of patients or operations. The large majority of patients in them are chronic, not acute, cases, and incurables. A smaller musing staff in proportion is needed. Some few of the best and largest have now training-schools for surses. Since 1875 Metropolitan Board asylums, superred also by the rates, have been built near London for fevers, for smallpox, for idiots and imbeciles, &e.

pox, for idiots and imbeciles, &e.

Lying-in Hospitals.—The lying-in hospitals require special consideration. The continuous use of wards for this purpose appears to be very dangerous to the patients. Indeed this would seem to be the reason why there are fewer casualties from this cause in workhouse infirmaries than in the ordinary lying-in hospital, and why the lying-in at home is safer than oither.

In Paris, where this subject has been much considered, two forms have been tried with good results. In one each patient has a small ward to herself, with its scullery or service-room attached, opening through a covered porch into an open verands. After each confinement the ward is cleaned and lime-whitel before further occupation. In these wards fatal results have been very rare. Another form is to have a ward which can hold two or more beds, in one of which the patient is brought for the delivery, and after a few hours she is wheeled out in the bed into a large ward where she remains with other patients who have also been delivered. With this plan also, where the delivery ward is cleaned and lime-whited at short intervals, and where two delivery wards are in use alternately, one always standing empty, fatal results have been rare. Instances of both forms of lying-in hospitals are not unknown in the United Kingdom. But it would be well if they were more universal.

Children's Hospitals unust be provided with establishments for bathing, playing indoors and ont, large garden-grounds, gymnastic grounds and halls, in and out of doors; the gymnastics should be under a professor, and out-patients should be always admitted. A 'sister' must superintend each of all these places. Singing in chorns is to be taught. It is a matter of universal hospital experience that intermingling of ages is essential. If you have a children's hospital, let the age of admission include lifteen years, especially on the female side. In all hospitals (in a child's hospital much more than in others) the patient must not stay a day longer than is absolutely necessary. Every child's hospital onght to have a convulescent branch at a distance; if possible by the sea. Sick children can never be left alone for a moment. One might almost say a nusse is required for every child. This is why in a general hospital it is much better for the children to be mixed with the adults; and, if they are judiciously distributed, it does the woman in the next bed as much good as it does the child, or the man as it does the little boy. If there must he a children's want in a general hospital, let it be for the infants.

Convalescent Hospitals must be as like a home and as unlike a hospital as possible. A string of detached cottages is the best, admitting of extension by the addition of similar parts. Convalescent wards in a general hospital are not good; nor are day-rooms. Healthy open position and climate must be carefully selected. The convalescents are only to sleep at night in their rooms, while in the day they are 'out and about,' or occupying themselves—the men in the garden, the women at household work. But there must be strict discipline. There must be two small wards for relapses next the 'sister's' room, in the centre cottage. The convalescent beds may be divided by enrains, to be pulled far back in the day-time. A wash-hand stand to be permitted within—no lavatory. Three or four beds a good number for each convalescent room. Men and women should have separate cottages, and only meet at meals. Every hospital should have its convalescent branch, and every county its convalescent home.

Hospitals for Incurables should admit all diseases certified by competent medical judges to be hopelessly incurable—except mental diseases, which require special arrangements. One well-known hospital for incurables excludes epilepsy because it frightens the other patients; avoids, if possible, congenital and infantile disease; prefers patients of and above middle age; and excludes children and all under twenty years. The cases treated by incurable hospitals are principally cases of chronic rhenmatism, gout, paralysis, and various affections which cripple the limbs, &c. These hospitals, while treating cases within their walls, are no doubt productive of great benefit to the community; but the system of granting pensions from the hospital funds to out-patients is very questionable.

hospital funds to out-patients is very questionable. A Samaritan fund is generally provided to assist poor patients leaving hospitals who may be deficient in clothing or other necessaries. In public Dispensaries (q.v.), at stated hours, medical advice and medicines are given gratis to applicants; in recent years provident dispensaries have been established, supported by subscriptions, entitling the subscriber to advice and medicine. Valuable establishments are those called in France Maisons de Santé—private hospitals for the reception and treatment of patients who are able and disposed to pay a small sum for board and medical or surgical attendance.

HOSPITAL SUNDAY. On one Sunday in the year it is the practice for churches of almost every denomination in London and throughout the provinces to have special collections for the support of the hospitals of the country. In London the

movement originated in 1873, its author being Dr Wakley, editor of the *Luncet*; and the gross total collected there in 1873-89 was £512,476.

total collected there in 1873-89 was £512,476.

See Monat and H. Saxon Snell, Hospital Construction and Management (1884); J. Clifford Smith, Report of Conference on Administration of Hospitals, 1863; Douglas Galton, Construction of Hospitals (1870); as also his Report on Herbert Hospital, Woolwich (1865), and his article on 'Hospital Administration' in Quain's Dictionary; H. Saxon Snell, Charitable and Parochial Institutions; Florence Nightingale, Notes on Hospitals (1859; new ed. 1863), and Notes on Lying-in Institutions (1871); and, amongst bluebooks, the Reports of Commissions on the Sanitary Condition of Barracks and Hospitals (1863), on Regulations affecting the Sanitary Condition of the Army and Organisation of Hospitals (1863), and on Smallpox and Fever Hospitals (1862).

Hospitals, a Slavonic title once commonly

Hospodar, a Slavonic title once commonly given to the governors of Moldavia and Wallachia, whereas the king of Roumania is now known under the native Romanic title of *Domnu*. Lithmanian princes and Polish kings also bore the title.

Host (Lat. hostia, 'a victim'), the name given in the Roman Catholic Church to the consecrated bread of the eucharist. It is so called in conformity with the doctrine of that church that the eucharist is a 'sacrifice,' in the strict sense of the word, though, in the common language of Catholics, 'host' is used for the unconscerated altar-bread, and even so occurs in the offertory of the Roman and even so occurs in the offertory of the Rollan missal. The bost in the Latin Church is a thin circular wafer (in Old English, 'syngeing cake') of inleavened bread, made of the finest flour, and bearing stamped upon it the figure of the Crucifixion or some emblematic device, as the Lamb, or the letters IHS. These are the 'points' and 'figures' forbidden in the first book of Edward VI. In all ancient liturgical rites the consecrated host was broken before being consumed by the priest. In the Roman Church the celebrant, who uses at mass a larger host than that reserved for other communicants, first breaks it into two halves, and then from one half detaches a fragment which he then from one half detaches a fragment which he drops into the chalice. In the Greek and other oriental churches, as well as in various Protestant communities, the encharist is celebrated in leavened hread; and one of the grounds of separation from the West alleged by Michael Cerularins was the western practice of using unleavened hread. The use of unleavened bread is founded on the belief that Christ can only have used such bread when instituting the eucharist at the Paschul feast. Luther followed the Roman the Paschal feast. Luther followed the Roman Church in this point, but did not break the host. the was decided by the Privy-council, in the Purchas case (1871), that the use of the wafer is forbidden in the Church of England. The elevation of the host is the act by which the priest immediately after pronouncing the words of consecration raises the host with both hands above his head, whilst the server tinkles his bell to call attention to the ceremony, that the congregation may adore Christ' present.

Hostage, a person given to an enemy as a pledge for the proper fulfilment of treaty conditions. Formerly the evasion of the terms of the treaty by one of the contracting parties used to be regarded as entitling the enemy to put to death the hostages that had been given up to them. The shooting of Archbishop Darboy (q.v.) and his fellow hostages in 1871 was the most execrable crime of the Paris Communists.

Hostilius, Tullus, the third of the legendary kings of Rome, succeeded Numa Poupilius in 670 B.C. He it was who made the famous arrangement by which the combat of the Horatii with the Curiatii decided the question of supremacy between Rome and Alba in favour of the former. He fought

against Fideme and Veii, and conquered them; and destroyed Alba, and removed the inhabitants to Rome, giving them Mount Calius to dwell on; and carried on war against the Sabines. At length the gods grew wrathful with him for his love of war and his neglect to worship them, and Jupiter Elicius consumed him and his house with fire about 638 B.C. According to Niebulm and Arnold, there are glimpses of a distinct personality in the legend of Hostilius, unlike those of Romnius and Numa, which are merely personifications of the two principal stages of a nation's growth.

Hothed, a bed of fermenting vegetable matter, usually surmounted by a glazed frame, employed in gardening for entitivating melons and encombers, the rearing of tender animals, propagating stove and greenhouse plants by cuttings, seeds, or grafting, foreing flowers, &c. It is an inexpensive means for obtaining a high temperature in a limited atmosphere, accompanied with genial lumnidity charged with untritions gases, which is very beneficial to plants. Formerly it was an indispensable adjunct to the garden, but the almost universal employment of hot water as a heating agent for horticultural purposes has latterly greatly circumseribed its use. The materials used in making hotheds are stable-dung, leaves—those of the oak and beech, being especially suitable, are frequently mixed with the dung—tanners' back, spent hops, and the waste of jute, cotton, houp, and flax, all of which must be allowed to pass through the first violent stages of fermentation in order to eliminate the deloterious gases they contain before being built up into the bed. The size of the bod is regulated by the degree of heat required for the purpose in view. A bed of stable-dung with or without leaves intermixed, four feet thick, will for some time after it is built maintain a temperature of from 75° to 90°, which is sufficient for most purposes. As the fermentation declines the bed cools down, but heat is again readily increased by adding fresh material to the sides of it. The bed should be made a few inches wider and longer than the frame that is to be placed upon it, and from 6 to 9 inches higher at the back than the front to scenre a better angle for light. See also PLANT-HOUSE.

Hotchpot (the same word as Hotch-potch in the culinary sense), a phrase used in English law to denote that, whore one child has already received an advancement out of the father's estate, that child must bring such portion into hotchpot before he will be allowed to share with the other children, under the statute of distributions, after the father's death. In other words, a child who has got money from the father to place him in business, &e., must treat that as a payment to account of his share at the father's death. The cldest son is not required to bring into hotchpot the land which he takes as heir. A similar, but not identical, doctrine exists in Scotland under the name of collation.

Hotch-potch, a Scottish dish, may be defined as a kind of mutton-broth in which green peas take the place of barley or rice. Hotch-potch or Hodge-podge is a corruption of Old English hotch-pot; Fr. hochepot; from Dutch hutspot (hutsen being 'to shake in the pot').

Hot Cross Buns. See Cross-Buns.

Hotel (Fr. hôtel, Old Fr. hostel, Lat. hospitale), a superior kind of inn (see Inn), like the old English hostel. The often palatial hotels that have sprung up since the introduction of railways are too well known to require notice. One point of difference between the European and the American systems is that under the former, except in the case of a table d'hôte, the charge is for each dish ordered, while under the American plan a fixed

price is charged for every meal. The modern French word is still used for the house of a rich or distinguished man, or for a public building, such as the *Hotel de Ville* (see MUNICIPAL ARCHITECTURE), as well as for inn or hostelry.

Hothouse. See Plant-house.

Hot Springs, a small town of Arkansus, 56 miles WSW. of Little Rock, much frequented as a summer-resort. It has over fifty thermal springs, ranging in temperature from 95° to 148° F. Pop. 3554.

Hotspur, HARRY. See PERCY.

Hottentots, the people who were in possession of the greater part of what is now Cape Colony when it was first visited and colonised by Enropeans. The Hottentots were so called by the enliest Dutch settlers, puzzled at their strange harsh faneal sounds and clicks, Hottentot or Hittentit signifying a quack in Frisian or Low German. 1t is a somewhat misleading name, as it is popularly used to include the two distinct families distinused to include the two distinet families distinguished by their native names: the Khoikhoi, the so-called Hottentot proper, and the Sān (Sā) or Bushmen, between whom little charity exists. Again, among the Khoikhoi proper, the terms Hottentots, Hottentots proper, or Capo Hottentots are often applied to the remnants of the tribes who formerly lived around Capetown; while the inhabitants of Griqualand West, of the South Kalihari, and of Great Namaqualand are distinguished by their tribal names as Griquas, Namaquas, Koras or Koranas, as if they were not as much Hottentots as the Khoikhoi of Cape Colony. The Bushmen are hunters; the Khoikhoi, nomads and sheep-farmers. At the present time the and sheep-farmers. At the present time the so-called Hottentots proper may number about 17,000; and the half-breeds, mostly employed in the Cape Colony, may number probably 100,000. The majority of the former and almost all the latter class are now semi-civilised, and copy the habits, enstons, dress, and vices of the European colonists. In general they are of medium height, not very robust in build, and have small hands and feet. Their skin is a pale brown colour; their hair woolly, growing in enrly knots; their cheek bones very prominent; and their chin pointed. The women are sometimes distinguished by certain organic peculiarities, and often have an enormous development of fat, especially in the breasts and hinderparts. Their principal characteristics in former days were indolence and hospitality. Their favourite amusements were feasting, dancing, smoking, and singing. The men were herdsmen, and straff found of the late them the visited to hand smoking, and singing. The men were herdsmen, and not fond of war, though they liked to hunt. The women, although held in high esteem, performed all the manual labour. Their dwellings were lints of wood and mats, or tents, disposed in circles, and easily transportable. Their manner of living was entirely patriarchal: each tribe or division of a tribe had its own chief. Their method of perpetuating family names was that the sons took their mother's family name, whilst the daughters took their father's.

Their language embraced three principal dialects—the Nama, spoken by the Namaquas; the Kora, spoken by the Koranas; and the Cape dialect, now almost, if not entirely, extinct. Owing to its use of suffixes for expressing the declensions of nouns and the conjugations of verbs, the Hottentot language has been classed by Bleek, Lepsius, and other scholars with the Hamitic family of speech. This view is, however, controverted by Fr. Müller, Hahn, and Von Gabelentz, who maintain that the Hottentots and Bushmen are allied peoples, the aboriginal inhabitants of the greater part of South Africa. The association of the Bushmen with the Hottentots rests, however, upon little more than the

common possession of a few verbal roots and the common use of some harsh fancal sounds or 'clicks' in their manner of speech. These 'clicks' are four in number—a dental sound, usually represented by the sign |; a palatal, by #; a lateral, by #; and a cerebral, by !. All the Khoikhoi idioms are distinguished by monosyllabic roots ending in a vowel, and the use of pronouninal elements as suffixes for the purpose of forming derivatives. They possess no prefixes. One striking feature is a decimal system of counting.

They have both sacred and profane poetry, and both kinds are sum accommanied by

hynns of both kinds are sung accompanied by the so-called reed-music or reed-dances, performed on reed or bark pipes. The sacred hynns are on reed or bark pipes. The sacred bymns are generally prayers, invocations, and sougs of praise in honour of the supreme being Tsuilgoab, the beneficent deity Heitsi-cibib, and the Moon; while the profanc reed-songs or dances deplore the fate of some dead chief or hero, or are sarcastic lessons to some one who has done something unpopular. They are often given by way of welcome to some guest worthy of honour, and in every large knad there is a handmaster, whose business it is to drill the young boys and girls in this music. Dr Halm compares its effect to the harmonium. The chief compares us effect to the narmonium. The emer divinities of the Klinikhoi, as has been seen, are the supreme being Tsūigoah, who lives in the Red Sky; another beneficent being, Heitsi-eibih, eonsidered as an ancestral deity, who came originally from the East; and [Gaunab, an evil spirit, whose malignant influence has to be averted by prayers and charms, which furnish employment to troops of professional sorcerers. The mythology is rich, but singularly confused and difficult of interpretation. It contains also repulsive features enough, but not more so than the old Greek. Much more might have been known had well-meaning missionaries been more sympathetic or intelligent. Beyond the hymns spoken of, the popular imagination has originated, or at least retained, a great number of fables, as well as legends, proverbs, and riddles. One persistent feature in these is a strong inclination to personifications of impersonal beings. Speech and reason are freely imputed to the lower animals, and luman-like agencies cumployed freely as causes of celestial and other natural phenomena. The first to give examples of these was Captain (afterwards Sir) James Alexander in his Expedition of Discovery into the Interior of Africa (2 vols. 1838). More were brought to light by Krönlein and other scholars, and in 1864 Dr W. H. I. Bleek gave a good selection in his Reynard the Fox in South Africa: Hottentot Fables and Tules.

For the language, see the grammars by Tindall (1871), Hahn (1870), Fr. Müller (Grundriss der Sprachwissenschaft, vol. ii. 1877), and Bleek (1802-09). For the people, see Dr Gustav Fritsch, Die Eingeborenen Süd-Africas (1872); and Dr T. Hahn's Tsunillgoam: the Supreme Being of the Khoi-Khoi (1882).

Hottentots' Bread. See DIOSCOREACEE.

Hottonia. See Water-violet.

Houdin, Robert (1805-71). See Conjuring.

Houdon, Jean-Antoine, the greatest French sculptor of the 18th century, was born at Versailles, 20th March 1741. He was of humble origin, his father holding office in a nobleman's house. He was a born sculptor, and at the age of thirteen had already attracted notice. An untrannucled eclecticism was ever Houdon's most prominent characteristic. In 1761, when he was but twenty, he won the prix de Rome, and in Rome he threw himself with enthusiasm into the study of the antique. Herculaneum and Pompeii had not long been brought to light. All Winckelmann's works were published during Houdon's sojourn in Italy. Ten

years he remained in Rome, and there executed the colossal figure of St Bruno, the founder of the order of the Chartreuse, of which Pope Clement XIV. said that it would speak did not the rules of its order enforce silence. On his return to France the usual official honours were conferred upon him. 1777 he was received into the Academy; in 1796 he was elected member of the Institute; and he was appointed professor at the École des Écaux arts in 1805. Apart from his work his life was singularly uneventful, though he once visited America under the escort of Franklin, to excente a monument in honour of Washington (1785). Nor did he altogether e-cape from the troubles of the Revolution. An allegorical figure from his hand, entitled 'Sainte Scholastique,' involved him in the heinous charge of desiring to perpetnate the worship of the saints. But on pleading that his statue only represented Philosophy, he was acquitted. Towards the end of his life his intellect failed him, and death came as a release, 16th July 1828. Hondon is perhaps the most conspicuous figure among the artists of his time. time. His mastery over his material was complete. So great were his technical skill and adroitness that they sometimes carried him beyond the bounds of his art. He had essayed all styles without sacrificing his personality, and, while much of his work has an almost classical simplicity, it was generally his method (in portraiture at least) to obtain a secondary of the contraiture at least of the contrai resemblance by an infinitude of details. It is a little strange that his 'Ecorche' should be the most widely known of his works. For it was in por-Traiture that his greatest triumplis were achieved. Turgot, Rousseau, Voltaire, Diderot, Franklin, Washington, Lafayette, Mirabeau, Napoleon, and Mdlle. Arnauld are a few of the great men and women whose features he has perpetuated for us. In 1890 a statue of him was erected at Versailles at a cost of 10,000 francs.

Houghton, Richard Monckton Milnes, Lord, was born of a good old Yorkshire family at Fryston Hall, Pontefract, 19th June 1809. His father, 'single-speech Milnes' (1784-1858), of Fryston, Bawtry, and Great Houghton, declined the chancellouship of the exchequer and a peerage; his mother was a danghter of the fourth Lord Galway. Educated by private tutors at home and in Italy, he went up to Trinity College, Cambridge, where he graduated M.A. in 1831, and where he was a leader in the Union (then 'cavernous, tavernous'), and one of the famous band of 'Apostles.' From 1837 till 1863 he represented Pontefract, first as a Conscrvative, but latterly as an independent Liberal; and then he was called by Lord Palmerston to the Upper House, of which for a score of years he was 'the only poet.' In 1851 he married a daughter of the second Lord Crewe. She died in 1874; and he himself, having three years before had a passing attack of paralysis, died suddenly at Vichy, 11th August 1885. A Macenas of poets (and of poetasters), he got Lord Tennyson the launeateship, soothed the dying hours of poor David Gray, and was one of the lirst to recognise Mr Swinburne's genins. His own poetry is always respectable, and some of the shorter pieces were in their day exceedingly popular—'Strangers Yet,' for example, and the pretty lyric whose refrain is 'The beating of my own heart Was the only sound I heard.' Besides this, Lord Houghton—the 'Mr Vavasour' of Beaconsfield's Tauerzet—was a traveller, a philanthropist, an unrivalled after-dinner speaker, and Rogers' successor in the art of breakfast-giving. He went up in a balloon, and down in a diving-bell; he was the first publishing Englishman who gamed access to the harens of the East; he elampioned oppressed nationalities, liberty of conscience, figitive slaves, and the rights of women; he carried a bill for establishing

reformatories (1846); and he counted among his friends Hallam, Teunyson, Thackeray, Dickens, Carlyle, Sydney Smith, Landor, Cardinal Wiseman, Heine, Thirlwall, and a host of others.

Heine, Thirlwall, and a host of others.

Lord Houghton's works include Memorials of a Tour in Gracee (1833); Poems of many Years (1838); Memorials of a Residence on the Continent (1838); Poetry for the People (1840); Memorials of many Scenes (1843); Palm Leaves (1814); Life Letters, and Remains of Keats (2 vols. 1848); Good Night and Good Morning (1859); Monoraphs, Personal and Societ (1873); and Collected Poetical Works (2 vols. 1876), See an article by T. H. S. Escott in the Fortnightly for September 1885, and a promised Life by Wemyss-Reid.

Houghton-le-Spring, a town in the county, and 6½ miles NE. of the city, of Durham. Its rapid growth is mainly due to the extension of neighbouring collieries. The fine eruciform parish church contains the cinque-cento altar tomb of Bernard (filpin (q.v.), who founded a grammarschool here, and among whose successors were Peter Heylin and Archbishop Sancroft. Pop. (1831) 3224; (1881) 6041.

Hound, a name applied to dogs used in hunting. The true hound, such as the Bloodhound, the Foxhound, and the Staghound, hunt only by seent. In this division may also be included the Bassethound (a short-legged dog used in uncarthing foxes and badgers), the Beagle, and the Harrier. The greyhound and the deerhound run by sight alone, and are not hounds in the correct acceptance of the term. See also FOX-HUNTING.

Hound's-tongue (Cynoglossum), a genus of plants of the natural order Boraginere, of which there are many species, all of a coarse appearance, with small flowers. The Common Hound's-tongue (C. officinale) is a native of Europe, Asia, Africa, and North America; not uncommon in some parts of Britain, especially near the sea-coast. It has soft downy leaves, of a dull green colour, purplished flowers, and a stem about two feet high.



Hound's tongue (Cynoglossum officinale).

Its odour is very disagreeable. The root was formerly administered in scrofnla, dysentery, &c., and is said to be anodyne. It is also one of the pretended specifics for serpent-lites and hydrophobia.

Hounslow, a town of Middlesex, 10 miles W. by S. from London by road, was formerly a place of much importance in the old coaching days, it being the first stage out of London on the Bath and Southampton roads. As many as 800 horses were then maintained hero, 500 coaches passed through

daily, whilst a most extensive business in posting was carried on. With the opening of the railways, however, the place gradually declined, and at the present time it contains but little of interest. Its three churches are all modern, the oldest, rebuilt in 1835, having been formerly the chapel of a priory. West from Honnslow, stretching for 5 miles along the road, and in 1546 containing an area of 4293 acres, was Honnslow Heath, the scene of many military encampments, and notorious in the annals of highway robbery. It is now for the most part enclosed. Near to the town are extensive gumpowder-mills and envalry and militia barracks, and at Kneller's Hall, once the residence of Sir C. Kneller, the painter, are the quarters of the Royal Military School of Music. Pop. (1851) 3514; (1871) 9294; (1881) 10,459, of which the barracks contained 1038.

Hour, a measure of time equal to the thing at the part of an astronomical day or to the part of a natural day (excluding the hours of night or darkness). See DAY, and TIME; and for the hours in Catholic mage, see BREVIARY.—Hour-circles, in astronomy, are any great circles which cut the poles.

Hour-glass, an instrument for measuring intervals of time. It is made of glass, and consists of two bulbs united by a narrow neck; one of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as unnel as can run through the orifice in an hour, if the instrument is to be an hour-glass; in a minute, if a minuteglass, &c. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of the time. The hour-glass was almost universally employed in churches during the 16th and 17th centuries. In several of the churches in England hourglass stands of elegant workmanship are still to be seen.

Mouri, the name of the beautiful damsels who, according to the Moslem faith, await with their companiouship in Paradise the true believers after death. See MOHAMMEDANISM.

Housatonic River rises in Massachusetts, flows through Connecticut, and enters Long Island Sound near Bridgeport. In its course of nearly 150 miles it affords water-power to many manufacturing villages.

House, in point of law, is an Englishman's castle, though not a Scotchman's. In other words, when a man shirts himself up in his own house no bailiff can break open the door to arrest him, or seize his goods for debt, in England, and no court can give such power, except in the case of a writ of attachment for contempt of court or a writ of habere fucius possessionem (the writ by which a judgment for the recovery of land is commonly In Scotland leave can be got from enforced). the court, often called on that account the king's or queen's keys, to enable the messenger to break open the onter door and arrest. In England, though it is not competent for the bailiff to break open the outer door by force, yet every trick or stratagem is fair in order to effect a peaceable entry, and once in he cannot be turned out. Where the party is charged with a criminal offence a constable armed with a warrant, or in some cases without, is entitled to break into the house and arrest him, both in England and Scotland. A man is entitled also to defend his house against trespassers and thieves, using no greater force than is necessary; and if necessary in that sense, he may even kill the intruder, though very strong circumstances are required to justify this. He may also

put spring-gans on the premises: but by doing so he may render himself liable to an action if any person lawfully entering the premises should be injured. In Scotland a peculiar name is given to the offence of feloniously assaulting a man in his own honse, called Hamesucken (q.v.), a name also used in the old law of England; and all offences committed in another person's house are generally punished more severely than those not committed in a house at all. See also EVICTION.

House-boat. See BARGE.

Housebote. See Estover.

Housebreaking is the breaking and entering into a dwelling house, shop, or warehouse, between the hours of 6 A.M. and 9 P.M., and stealing any chattel or money to any value. The drawing a latch, the opening a window, or the employment of fraudulent means to effect an entry constitutes breaking and entering. The punishment ranges from fourteen years' penal servitude to two years' imprisonment. See Burglary, where the law in the United States is also noticed.

Houseburning. See Arson.

House-fly (Musca domestica), perhaps the most familiar and widely distributed dipterous insect. Adults are to be seen the whole year round, though naturally most numerous in summer. They feed indiscriminatingly on whatever they can suck up



Fig. 1.
a, larva of honse-fly, with breathing pores at tail (lower) end; b, young fly emerging from papa sheath.

indiscriminatingly on whatever they can suck up
through their fleshy prohose or scrape off with
their other mouth parts.
The females lay their eggs
in groups, about eight days
after pairing, and the whole
development occupies about
a month. The eggs are
deposited in decaying organic
matter, in dung, or in any
filth, and the larvice are
hatched in a day, or even
less if the weather be warm.
These larvæ are smooth,
maked maggots, without legs
or distinct head, with small
hooklets at the mouth, and
a length of about one-third
of an inch. They feed on

organic debris, move by contracting the abdomen, and grow for about a fortnight. Then they

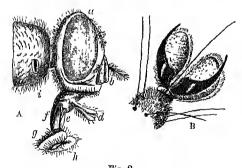


Fig. 2.

A, head of house-fly: a, compound eye; b, antenna; d, maxillary palps; c, f, 'probosels;' g, labelhe, lips of 'probosels;' h, opening into 'probosels;' d, thorax, with breathing pore (after Von Insyek). B, end of a fly's foot bighly magnified, showing long hairs, two terminal claws, and two membranous adhesive pads.

seek some dry resting-place, undergo pupation, and finally in another fortuight become winged insects.

Many parts of the house-fly, such as the sucking proboscis, or the hair-covered discs of the feet by which the insects adhere to the window-pane, well deserve the attention they generally get from those who use the microscope. Though house-flies do not bite, they are often extremely trouble-ome. Expedients for killing them off require no advertisement. It is more important to notice that house-flies are probably sometimes responsible for disseminating disease-genus.

Household. The King's on Queen's, in Great Britain comprises the departments of the Lord Steward (q.v.), the Lord Chamberlain (q.v.), with the Lords of the Bedchamber, a medical department, the Royal Almony, and the department of the Mistress of the Roles, which comprises the Ludies of the Bedchamber, the Bedchamber Women, and the Maids of Honour. For the Lords and Ladies of the Bedchamber, see Bedchamber (see also Royal Family). The Maids of Honour, of whom there are eight, are immediate attendants on the royal person, and in rotation perform the duty of accompanying the Queen on all occasions. They enjoy by courtesy the title 'Honourable,' when not entitled to it by birth, and are then designated the 'Honourable Miss — ' without the Christian name.

Household Troops are those troops whose especial duty it is to attend the sovereign and to gnard the metropolis. These forces comprise three regiments of cavalry—the 1st and 2d Life Gnards and the Royal Horse Gnards; and three regiments of foot—the Grenadier Gnards of three battalions, and the Coldstream and Scots Guards of two battalions each. See GUARDS.

House-leek (Sempervivum), a genus of plants of the natural order Crassulaceu, having a calyx of six to twenty sepals, the petals equal in number to the sepals, and inserted into the base of the calyx; the leaves generally very succulent, and

forming rosettes. Common House-leek or Cyphel tectorum), called Fous or Fouets in Scotand land, some countries Jupiter's Beard, grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, &c. It sends up leafy flowering stems of 6 to 12 inches in height, bearing branches of pale red starlike flowers, equally curious and beautiful.



Common House-leek (Sempervirum tectorum).

The leaves cut or bruised and applied to burns afford immediate relief, as they do also to stings by bees or wasps; and they are beneficial when applied to ulcers and inflamed sores. They were formerly in high esteem as a remedy for fevers and other diseases; and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. The edict is in these words: Et habat quisque supra domain suam Jovis barbam ('And let everybody have the

Jupiter's beard on his honse').—Other species possess similar properties. S. soboliferum, with yellowish-green flowers, is very frequently planted on walls in Germany. The fishermen of Madeira on walls in Germany. The fishermen of Madeira say that nets rubbed with the fresh leaves of S. glutinosum are thereby rendered as durable as if tanned, provided they are also steeped in some alkaline liquor. Some of the species, natives of the south of Europe, Canary Isles, &c., are shrubby; others are common greenhouse plants.

Housemaid's Knee is the term commonly applied to an acute or chronic inflammation of the bursa or sac that intervenes between the patella, or knee-pan, and the skin. Housemaids are especially liable to it from their kneeling on hard damp stones. In its acute form it causes considerable pain, swelling, and febrile disturbance.
The only disease for which it can be mistaken the cavity of the joint; but in this disease the patella is thrown forwards, and the swelling is at the sides, while in housemaid's knee the swelling is very superficial, and is in front of the patella. The treatment in the acute form consists essentially in the means usually employed to combat inflammation-viz. rest, leeches, fomentations, and progratives; if supportation take place the sac must be heely opened and the pus evacuated. The chronic form may subside under rest, blisters, &c., or it may require incision or excision for its cure.

House of Lords, Commons. See Parlia-MENT.

House-rents. See Landlord and Tenant.

Housing of the Poor. A Royal Commission to inquire into the condition of the working-classes sat in 1884 and 1885. Acts for facilitating improvement in the dwellings of the working-classes have been passed in 1868, 1875, and 1879. See Guinness, Hill, Peabody; as also Cottage, Labourers, Lodging-house, Poor.

Houssa. See Haussa.

Houston, capital of Harris county, Texas, on the navigable Bulfalo Bayon, 49 miles by rail NW. of Galveston, with which it is connected also by steamboats. It is the great railway centre of the state, stands in the midst of a fertile country, and ships layer apputition of catter can be applied. ships large quantities of cotton, grain, and cattle, besides the products of the great pino-forests, which are prepared here. The other manufactures include machinery, iron-castings, railway carriages, farming implements, fertilisers, cotton-seed oil, &c. Pop. (1870) 9382; (1880) 18,646; now much larger.

Houston, Samuel, president of Texas, was born in Rockbridge county, Virginia, March 2, 1793, was brought up near the Cherokee territory in Tennessee, and was adopted by one of the Indians there. In 1813 he enlisted as a private soldier, and by persistent bravery rose to the rank of second-lieutenant before the end of the war. He left the army in 1818, studied law at Nashville, and was elected in 1823 and 1825 a member of congress, and in 1827 governor of Tennessee. In January 1829 he married the daughter of an ex-governor; but in the following April, for reasons never made public, spent three years among the Cherokees, beyond the Mississippi, where his adoptive father had settled. In 1832 Houston went to Washington, and procured the removal of several United States Indian agents on charges of fraud, but got into personal difficulties with their friends. The Texan war difficulties with their friends. The Texan war offered a new field to his ambition. He was made commander-in-chief. The Americans at first sustained some severe losses, but on 21st April 1836 Houston with 750 men inflieted a crushing defeat on a force of 1800 Mexicans under Santa-Anna, on

the banks of the San Jacinto, and by this one decisive blow achieved the independence of Texas. The hero of San Jacinto was elected first president of the republic, and re-elected in 1841, and on the annexation of Texas, in 1845, was elected to the United States senate. Elected governor of Texas in 1859, he opposed secession, was deposed in March 1861, and took no further part in public affairs. He died 26th July 1863.

Hovas. See Madagascar

Hovedon, Roger of, an old English chronicler, most probably born at Howden, in Yorkshire, who was attached to the household of Henry II., and was employed in missions to the lords of Galloway and to the heads of the monastic houses. In 1189 he was appointed an itinerant justice for the forests in the northern counties, and he seems to have spent his last years in Yorkshine, probably at Howden. It may be supposed that he did not survive 1201. as his Chronicle ends with that year. It commences with the close of the Chronicle of Bede in 732, and first, ending with 1148, consisting chiefly of the Historia post Bedam; the second, ending with 1169, mainly based on the Meleose Chronicle; the third, ending with 1192, mainly an abridgment of Benedict's Chronicle; and the fourth, ending with 1201, a record of contemporary events, not without Saville's Scriptores post Bedam in 1596. There is an English translation by H. F. Riley in Bolm's 'Antiquarian Library' (2 vols. 1853). The original forms 4 volumes (1868-71) in the Rolls series, under the editorship of Bishop Stubbs.

Hovellers. See DEAL. Hoven. Sec Hoove.

Howard. The noble House of Howard has stood for many centuries at the head of the English nobility. The Howards have enjoyed the dukedom of Norfolk since the middle of the 15th century, and have contributed to the annals of the nation and have contributed to the annals of the nation several persons of the most distinguished character both in politics and in literature. Neither Sir W. Dugdale nor Collins claims for the Howards any more ancient origin than Sir William Howard, a learned Chief-justice of the Common Pleas under Edward I. and Edward II., though Dugdale incidentally unontions a tradition that their name is of Saxon origin, and derived either from an eminent office under the crown before the Conquest, or from Hereward, the leader of those forces which for a Hereward, the leader of those forces which for a time defended the isle of Ely so valiantly against William the Conqueror. The pedigree earlier than Sir William Howard has been completely demolished in an article on 'Donbtful Norfolk Pedigrees' printed in the Genealogist. Be this as it may, it is certain that Sir Julin Howard, the grandson of the above-mentioned judge, was not party admiral and cautain of the king's navy in the only admiral and captain of the king's navy in the north of England, but sheriff of Norfolk, in which county he held extensive property, which was subsequently increased by the marriage of his grand-son, Sir Robert, with the co-heiress of the ancient and noble House of Mowbray, Dukes of Norfolk. The only son of this union was Sir John Howard, one of the leading supporters of the House of York, who, having gained early distinction in the French wars of Henry VI., was constituted by Edward IV. constable of the important castle of Norwich, and sheriff of Norfolk and Suffolk. He subsequently became treasurer of the royal household, obtained a grant of the whole benefit that should accrue to the king by coinage of money in the City and Tower of London, and elsewhere in England; and further, was raised to the peerage as Lord Howard and Duke of Norfolk. We find him in 1470 made captain general of the king's forces at sea, and he was

most strennous in that capacity in his resistance to the House of Lancaster. Finally he was created Earl Marshal of England, an honorary distinction still borne by his descendants, and in 1484 was constituted Lord Admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and after his death his honours were attainted, as also were those of his son Thomas, who had been created Earl of Surrey. The latter, however, after suffering three years of imprisonment in the Tower of London, obtained a reversal of his own and his father's attainders, and, being restored to his honours accordingly, became distinguished as a general, and is more particularly celebrated in history for his defeat of the Seotch at Flodden in 1513. His son Thomas, third Duke of Norfolk, was attainted by Henry VIII., but was afterwards restored in blood, and by his marriage with a daughter of King Edward IV, became the father of the ill-fated and accomplished Earl of Surrey (q, v.), whose execution was the last of the many acts of tyranny which disgrace the memory of Henry VIII. The same sentence had been passed on the duke, when the death of the royal tyrant saved him from the block. His grandson Thomas, fourth Duke of Norfolk, in like manner suffered attainder, and was executed on Tower Hill for high-treason, for his communication with Mary, Queen of Scots. The family honours, however, were again restored, partly by James I. to his grandson, and partly by Claures II. to his great-grandson, Thomas, who thus became eighth duke, and whose consin and successor, Charles, ninth duke, was the direct ancestor of the present Duke of Norfolk.

It would be impossible here to give a list of all the honours which from time to time have been conferred on various branches of the ducal House

It would be impossible here to give a list of all the honours which from time to time have been conferred on various branches of the ducal House of Howard; it is sufficient to say that, in one or other of their widespread branches, the Howards either have enjoyed within the last three centuries, or still enjoy, the earldoms of Carlisle, Snlfolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Elfingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and

Howard of Effingham.

It will be seen from the above remarks that the ducal Honse of Norfolk is one whose fate it has been, beyond all others among the English nobility, to find its name interwoven with the thread of English history, and not rarely in colours of blood. The accomplished but unfortunate Surrey, and his searcely less unhappy father, Thomas Howard—whose head was only saved from the block on which his son so nobly suffered by the death of the eighth Henry—are 'household words' in the pages of English history; and readers of Shakespeare will have other recollections of the same name allied with other historical events; while those who are familiar with the writings of Pope will not have forgotten how tersely and pointedly he typifies the glory of ancestral pedigrees by 'All the blood of all the Howards.' Other members of the House of Howard have gained a place in the pages of English history. Sir Edward Howard, K. (f., Inother of the first Earl of Surrey, was made by Henry VIII. the king's standard bearer and admiral of the fleet, in which capacity he lost his life in hoarding a French vessel off Brest in action in 1513; his brother, Sir Edmund, aeted as marshal of the horse at Flodden; and his half-brother, Sir Thomas Howard, was attainted, and died a prisoner in the Tower, for aspiring to the hand of the Lady Margaret Douglas, daughter of Margaret, Queen of Scotland, and niece of Henry VIII., one of whose ill-fated consorts was the Lady Catharine Howard.

Howard, CATHARINE, fifth queen of Henry VIII., was a granddanghter of the second Duke of Norfolk. The year of her birth, not known with

certainty, was probably 1521 or 1522. Catharine was brought up partly in her father's house, partly in that of her grandmother, the Duchess of Norfolk. In 1540 the king matried Anne of Cleves. But it was a marriage for which he had no liking; and Gardiner, the Roman Catholic Bishop of Winchester, being just then recalled to favour, he and his party endeavoured to bring the king and Catharine together. Anne of Cleves was divorced on the 9th of July, and Henry married Catharine Howard on the 28th of the same month. But in November the queen was accused to Henry of having been gnilty of immoral conduct with two gentlemen of her grandmother's household, but previous to her marriage with the king. The evidence against her was convincing, and on this charge she was belieaded on 13th February 1542.

Howard, John, the philanthropist and prison reformer, was born at Hackney, in Middlesex, on 2d September 1726, though both place and date are given differently by different anthonities. His education was mostly got through private tuition, The inheritance of an ample fortune, which fell to him on the death of his father in 1742, enabled him to gratify his taste for continental travel. In 1756, after his wife's death, he set sail for Lisbon, which had just been devastated by the great earthquake, but was captured on the way by a French privateer, and carried to Brest, where he was thrown into prison. There even a short captivity sufficed to leave upon his mind a lasting impression of the inhuman treatment to which prisoners of war were subjected in French prisons. After his return home Howard married a second time, and settled at Car-dington, 3 miles from Bedford. That village reaped the first-fruits of those philanthropie exertions which afterwards culminated in such noble labour, the work of prison reform. In 1773 Howard was nominated high-sheriff for the county of Bedford, and his interest in prisons and their immates was now first fairly roused to the pitch of practical effort. He was struck with the injustice under which many poor prisoners suffered, in that they were detained in prison untried, or even after being pronounced innocent, until they or their friends had paid certain fees to the gaplers and other officials. Howard at once began a long series of toms throughout Great Britain and Ireland, for the purpose of investigating the condition of prisons, and inquiring into the management and treatment of prisoners. Chiefly as the result of his efforts, two acts were passed in 1774, one making provision for fixed salaries to be paid to the gaolers, and the other enforcing greater cleanliness in prisons, with a view to the prevention of the dreaded gaol-fever. From this time onward Howard prosecuted with unwearied zeal and patience this the great work of his lifetime, upheld by an indomitable sense of duty, and supported by a devont faith and his own firm, steadfast will. The remaining years of his life were principally spent in visiting the prisons of Great Britain and the countries of the Continent. Amongst the graver abuses he set himself to get abolished in his native land were such things as these: many prisons were in a deplorably dilapidated state, the cells narrow, filthy, and unhealthy; debtors and felons were confined promiscuously in the same prisons; separate apartments were not provided for the two sexes, and the gaolers were allowed to sell liquors to those placed under their charge, drunkenness. Howard's endeavours to relieve luman suffering in prisons easily turned his thoughts to hospitals; and he also directed his efforts to the alleviation of suffering and the removal of abuses in these establishments, as well as in schools and all kinds of benevolent institutions. From 1785 he devoted his attention

more especially to the plague, and to the consideration of means for its prevention. With sideration of means for its prevention. With this end in view, he studied it in the hospitals and lazarettos of the chief Mediterranean towns in which it was wont to show itself. But whilst still pursuing his investigations, he was himself struck down by typhus fever at Kherson, in Russia, and died on 20th January 1790. He was buried at Dophinovka (now Stepanovka), 4 miles N. of Kherson. The chief results of his extensive observations were recorded with faithful accuracy and great minuteness of detail, though with little sense great minuteness of detail, blodgi with the sense of generalisation, in two works—The State of Prisons in England and IVales, with an Account of some Foreign Prisons (1777), to which a supplement was added in 1780, whilst the editions of 1784 and 1792 were each an enlargement on its predecessor; and An Account of the Principal Lacarettes in Europe (1780). In consequence of his noble self-denying labours Howard has become the proverbial ideal of a philanthropist, the type of the best kind of humanitarian activity and love. Burke, in speaking of his labours at Bath in 1781, said, 'He has visited all Europe, not to survey the sumptnousness of palaces or the stateliness of temples; not to make accurate measurements of the remains of ancient grandenr, nor to form a scale of the enriosity of modern art; nor to collect medals or collect manuscripts; but to dive in the depths of dun-geons, to plungo into the infection of hospitals, to survey the mansions of sorrow and pain, to take the gauge and dimensions of misery, depression, and gauge and dimensions of misery, depression, and contempt, to remember the forgotten, to attend to the neglected, to visit the forsaken, and to compare and collate the distresses of all men in all countries. . . It was a voyage of discovery, a circumnavigation of charity.' See Lives by Baldwin Brown (1818), Taylor (1836), Hepworth Dixon (1849), Field (1850), and Stoughton (1853; new ed. 1884); Correspondence of Howard (1855) by J. Field; and the article Prisons.

Moward, Oliver Otis, an American general, was born at Leeds, Maine, 8th November 1830, gradnated at West Point in 1854, took command of a regiment of Maine volunteers in 1861, and was made brigadier-general for gallantry at the list battle of Bull Run. He lost an arm at Fair Oaks in 1862, but afterwards was in several actions, and in 1864 commanded the Army of the Temnessee in the invasion of Georgia. He commanded the right wing of Sherman's army in the march to the sea and through the Carolinas. He was commissioner of the Freedmen's Burean from 1865 nutil its abolition in 1874, and was the first president of Howard University (see Washington, D.C.), which was named in his honour. He conducted two Indian campaigns, in 1877 and 1878; in 1886 he was promoted to major-general, and received the command of the division of the Pacific; in 1889 he was transferred to that of the Atlantic. General Howard is a chevalier of the Legion of Honour (1884). He has published several books, including Chief Joseph (1881), an account of his campaign against the Nez Percés.

Howard of Effingham, CHARLES, LORD, was born in 1536, and in 1573 succeeded his father, who was the ninth son of the second Duke of Norfolk, and who in 1554 had been raised to the peerage and been made Lord High Admiral. In 1587 that dignity was conferred on the son, and as such in 1588 he commanded gloriously against the Armada (q.v.). For his share with Essex in the Caliz expedition (1596) he was created Earl of Nottingham, and in 1601 he put down Essex's mad insurrection. In 1619 he resigned his office in favour of Buckingham; and he died 14th December 1624. Contrary to the common opinion,

there is no proof that he was ever a Catholic (*Notes and Queries*, 1851, 1888).

Howe, ELLAS (1819-67), inventor of the Sewing-machine (q.v.).

owe, John, the most philosophie of the Puritan divines, was born 17th May 1630, at Lough-borough, in Leicestershire, to the living of which parish his father had been presented by Laud. He studied both at Oxford and Cambridge, where he made the friendship of the most distinguished professors and students of that day. After preaching for some time at Winwick, in Lancashire, and Great Torrington, in Devonshire, with much accept ance, he was appointed domestic chaplain to Crom. well in 1656, a position he occupied with great reluctance, but in which he discharged his difficult duties with rare firmness and courtesy, not fearing to speak his mind before Cromwell himself, and winning praise even from the enemies of his party. Indeed, throughout life he was on the most intimate terms with persons so wide apart as Baxter and other nonconformist divines, and the most distinguished ornaments of the Establishment, as Stilling-fleet and Tillotson. At the Restoration he returned to Torrington, where he remained for about two years. But the Act of Uniformity ejected him from his parish, 24th August 1662; for though one of the most liberal-minded of the Puritans, and not transluded with morbid conscientionsness. he was terms with persons so wide apart as Baxter and troubled with morbid conscientionness, he was also a man of strong principle. Like many others of the nonconformist ministers, he wandered about preaching in secret till 1671. In 1668 he published his first work, The Blessedness of the Righteons, which was very popular. In 1671 he was inrited by Lord Massarene, of Antrim Castle, in Ireland, to become his domestic chaplain, where he spent four years of great happiness, preaching every Sabbath at Antrim elurch, with the sanction of the bishop. Here he wrote his Vanity of Man as Mortal, and began his greatest work, The Good Man the Living Temple of God (1676-1702), which occupies one of the highest places in Puritan theology. In 1675 he was called to be pastor of the dissenting concernation in Silver Street Lordon and west In 1675 he was called to be pastor of the dissenting congregation in Silver Street, London, and went thither in the hegiuning of 1676. In 1677 he published, at the request of Mr Boyle, The Reconciliableness of God's Pressience of the Sins of Men with the Wisdom of His Counsels, and Exhortations; in 1681, Thoughtfulness for the Morrow; in 1682, Self-dedication; in 1683, Union among Protestants; and in 1684, The Redeemer's Tears wept over Lost Souls. In 1685 he was invited by Lord Wharton to travel with him on the Continent; and after visittravel with him on the Continent; and after visiting the principal cities, he resolved, owing to the state of England, to settle for a time at Utrecht, where he was admitted to several interviews with the Prince of Orange. In 1687 the Declaration for Liberty of Conscience induced him to return to England, and at the Revolution next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, in 1693, Carnality of Religious Contention; in 1694-95, several treatises on the Trinity; in 1699, The Redcemer's Dominion over the Invisible World; and he continued writing till 1705, when he published a characteristic work, Patience in Expectation of Future Blessedness. He died 2d April 1706.

Howe was a man of a nolle presence, with a finely-balanced mind, a profound thinker, yet gifted with great practical sagacity. His own convictions were very decided, yet he had large toleration for the opinions of others, and of one of his persecutors writes 'he did not doubt after all to meet him one day in that place where Luther and Zwinglins well agreed.' The value of his writings is greatly marred by a poor style and innumerable subdivisions and

digressions, which led a woman once to say 'he was so long laying the cloth that she always despaired of the dinner.' But Robert Hall said of him, '1 have derived more benefit from the works of Howe than from those of all other divines put together.' A great admiver of Plato, 'though without the slightest pretension to the eloquence of the renowned Grecian, he bore no mean resemblance to him in loftiness of mind, sublimity of conception, and, above all, in intense admiration of all moral excellence.' 'Of the consummate ability with which he must have conducted himself no other proof is needed than the statement of the following facts: that he was often employed in the most delicate affairs by Cromwell, yet without incurring either blame or suspicion; without betraying confidence or compromising principle; that, though exposed to scrutinising eyes, he left not a rivet of his armour open to the shafts either of malice or envy, and that he could awe Cromwell into silence and move Tillotson to tears; that he never made an enemy and never lost a friend.' His works were published in 1724, 2 vols, folio, with a life by Dr Calamy; more than one edition has been published since. See Henry Rogers' Life and Character of John Howe (1836).

Howe, RIGHARD HOWE, EARL, British admiral, the son of the second Viscount Howe of the Irish peerage, was born in 1725. He left Eton at fourteen, and, entering the navy, served under Anson (q.v.) against the Spaniards in the Pacific. Made post-captain at twenty, he in that same year drove away from the coast of Scotland two French ships conveying troops and ammunition to the young Pretender. After serving off the coast of Africa, Hawe took an active part in the naval operations of the British during the Seven Years' War, especially distinguishing himself by the capture of the island of Chansey, in the attacks upon the isle of Aix, St Malo, and Cherbourg, and in engagements with the French fleet in 1755 and 1759. In 1758 he succeeded to the Irish title of viscount on the death of his brother, George Angustus (1724-58), the brigadier-general, who was killed before Ticonderoga. Appointed a Lord of the Admiralty in 1763, he was promoted two years later to the important office of Treasurer of the Navy. In 1778 he defended the American coast against a superior naval force under D'Estaing, whom he repelled off Rhode Island. He was made a viscount of Great Britain in 1782. He was made a viscount of Great Britain in 1782. Being sent out the same year to relieve Gibraltar, he disembarked troops, ammunition, and supplies, and then offered hattle to the combined flects of France and Spain, but they, declining an engagement, drew off towards Cadiz. Howe was made First Lord of the Admiralty in 1783, and received an English earldom in 1788. When war with France broke out in 1793 he took command of the Channel fleet, and next year gained off Ushant the victory which is known as that of 'the glorious first of June.' The French fleet consisted of twenty-six ships of the line, and the British of twenty-five. a very short time the latter captured seven of the enemy's vessels and dismasted ten more. Howe's last public service was to bring lack to their duty the mutinous seamen at Spithead and Portsmouth in 1797. He died August 5, 1799, leaving the reputation of being a thorough seaman, cantious, cool and intrepid in danger, and considerate of his men. He greatly increased the efficiency of the navy by the introduction of a new system of evolutions and naval tactics. Sce Lives by G. Mason (1803) and Sir J. Barrow (1838).—Another brother, WILLIAM (1729–1814), held a command under Wolfe at Queliec, succeeded General Gage in 1775 as com-mander in chief of the British forces in America, eommanded at Bunker Hill, took New York, defeating Washington at White Plains and at

Brandywine, but was superseded by Sir Henry Cliutou in 1778, for having lost the opportunity of destroying the American force at Valley Forge. He subsequently held various honorary commands in Britain, and succeeded to his brother's viscounty in 1799.

Howe, Samuel Gridley, M.D., an American philanthropist, was born in Boston, November 10, 1801, and graduated at Brown University in 1821, and at the Harvard medical school in 1824. He served as a surgeon during the Greek war of independence from 1824 to 1827, organising the medical staff of the Greek army. He then went to America to raise contributions, and, returning with food, clothing, and supplies, formed a colony on the istlumus of Corinth. Swamp-fever, however, drove him from the country in 1830. In 1831 he went to Paris to study the methods of educating the blind, and, having become mixed up in the Polish insurrection, spent six weeks in a Prussian prison. On his return to Boston he established a school for the blind, his most famous pupil being Laura Bridgman (q.v.). He also established a school for the training of idiots. In 1851–53, assisted by his wife, he edited the anti-slavery Commonwealth, and, after revisiting Greece in 1867 with supplies for the Cretaus, he edited in Boston The Cretan. He died 9th January 1876.—His wife, Julia Ward Howe, born in New York city, 27th May 1819, became mominent in the woman-suffrage movement since 1869, preached in American Unitarian pulpits, and published, besides narratives of travel and a Life of Margaret Fuller, several volumes of poems, Passion Flowers (1854), Words for the Hour (1857), and Later Lyrics (1866), the last the best. In 1861 she wrote the 'Battle-hyun of the Republic.'

Howell, JAMES, whose Familiar Letters is still an English classic, was born about 1594, son of the minister of Abernant, in Carmarthenshire. He had his education at Hereford and Jesus College, Oxford, and took his B.A. in 1613. He then became steward to a glass-ware manufactory, and traversed in its interests Holland, Flanders, Spain, France, and the Hereford and Jesus Lives Holland, Flanders, Spain, France, and Jesus House House and Jesus Lives Holland. and Italy. He was next employed abroad on public business in 1626, became sccretary to Lord Scroop at York, was returned to parliament for Richmond in 1627, sent with the Earl of Leicester to Denmark in 1632, and appointed in 1642 clerk to the Privyconneil. Next year he was sent by the Parliament to the Fleet, where he lay till 1648. At the Restoration the office of historiographer-royal was created for him. He died in 1666, and was buried in the Temple church. Howell was a mar of considerable humonr, learning, and industry Howell was a man Besides translations from Italian, French, and Spanish, he wrote no less than forty-one original Spanish, he wrote no less than forty-one original works on history, politics, and philological matters. He had put his travels to much profit. 'Thank God,' he says, 'I have this fruit of my foreign travels, that I can pray unto him every day of the week in a separate language, and upon Sunday in seven.' His Instructions for Forreine Travell (1642) is still interesting, and is reprinted in Professor Arber's series (1869); and his supplement to Category's Branch and English dictionary main-Cotgrave's French and English dictionary maintains its interest for lexicographers; but it is by his Epistolæ Ho-Elianæ: or Familiar Letters, Domestic and Foreign (1645-55; 10th ed. 1787), that his name continues to be remembered. These display not only shrewd sense and brilliant wit, but also grace and form, and indeed are the earliest letters in our language that are really literary.

Dr Bliss, the crudite editor of Wood's Athenæ Oxonienses, intended to edit Howell's Letters; this was at length adequately done by Mr Joseph Jacobs in 1890.

Howell's State Trials, the name given to the series originated by Cobbett in 1809,

because vols. xi. to xxi. of this work were edited by T. B. Howell (died 1817), and vols. xxi. to xxviii. by his son, Thomas Jones Howell.

Howells, William Dean, a popular American novelist, was born at Martin's Fenry, Ohio, 1st March 1837. His father's family was of Welsh Quaker origin, and he himself was brought up a Swedenborgian. From an early age he was familiar with press-work, as his father was a busy and not always prosperous printer and journalist; but his earliest serions work in journalism was in the Cincinnati Gazette and Columbus State Journal. A life of Lincoln, written in 1860, procured him the post of consul at Venice, which be held from 1861 to 1865, making himself master of Italian the while, and writing his able papers, collected in Venetian Life (1866). After his return to America he wrote for the New York Tribune and the Times, the Nation, and the Atlantic Monthly, and filled the editor's chair of the last from 1872 till his retirement in 1881. His later work in periodicals was done for the Ceatury and Harper's Magazine. He had already made his mark as a first-rate journalist, a fair poet, and a clever critic, when in 1871 he found his real work as a writer of fiction. His clever story, Their Wedding Journey, at once brought him popularity which quickly grew in Eugland no less than America, as the growing merit of succeeding novels made it more and more deserved. Of these the best are A Chance Arganintance (1873), A Foregone Conclusion (1874), A Counterfeit Presentment (1877), The Ludy of the Arosstock (1878), The Undiscovered Country (1880), Doctor Breen's Practice (1883), A Modern Instance (1883), A IVonan's Reason (1884), The Rise of Silas Lapham (1855), An Indian Summer (1886), Annie Kilbura (1888), and A Hazard of New Fartnes (1889).

These works reveal their author to us as an artist of great conscientionsness and industry, but of decided shortcomings as well as gifts. He is humorous, brilliant, epigrammatic, and acute, but he cannot tell a story, and his ambitious analysis of commonplace characters is overdone to the extent of tedionsness. With all his gifts he is not a great artist in fiction, and he lacks that rare combination of sympathy and humonr which gave George Eliot and Mrs Gaskell their insight into what was really generic and human at the heart of the trivialities of everyday life. Howells wastes his strength on the over-elaboration of details, but too often these are not the really significant, and thus the general effect of the whole portrait is feeble, indistinct, and unsatisfactory. His over-elaborated rather than really refined Bostonians, and his Americans expanding spiritually under the new conditions of an ancient civilisation in some Italian city are always carefully painted and indeed striking portraits, but almost always they fall a little short of the one thing needful—that look of the life which is creation, and which evidently demands the intuition of genius to catch.

Howictoun. See Pisciculture.

Howitt, WILLIAM and MARY, whose writings charmed, interested, and instructed the public during the earlier half of the 19th centary, may best be treated together. William Howitt, the son of a land-surveyor of good descent, a member of the Society of Friends, was boun at Heanor, Derbyshire, in 1792, and was educated at Ackworth and Tamworth. With no intention of pursuing the business, he served a four years' apprenticeship to a builder, carpenter, and cabinet-maker. Possessed of strong literary tastes, and fond of country life and sports, he wrote poems, and an account of a country excursion after the manner of

Washington Irving. On April 16, 1821, William Howitt married Mary Botham, a young lady of kindred tastes (born at Uttoxeter, 12th March 1799), and they settled at Hanley, to conduct a chemist's business. After a few months they removed to Nottingham for twelve years of steady and successful literary industry and mental improvement. Their later places of abode were Esher, in Surrey, London, Heidelberg, and Rome. The record of their after-life is a record of the books they wrote, of pleasant travel for literary purposes, while they were on terms of easy intercourse with while they were on terms of easy intercourse with all their notable contemporaries. In 1852-54, at the beight of the gold-fever, William Howitt was in Australia. The Howitts were instrumental in getting £1000 for Miss Meteyard's life of Wedgwood, and it was at William Howitt's suggestion that Mrs Gaskell wrote her first novel. They quitted the Society of Friends in 1847; William Howitt became a believer in spiritualism, and in later life Mary Howitt joined the Catholic communion. After a long life of blanneless literary industry William Howitt died at Rome, March 3, 1879. Mary Howitt, whose heart and mind 'ever 1879. Mary Howitt, whose heart and mind 'ever flowed with love and interest for all her surroundings,' composed and wrote from her carliest years, and most people have seen or read some of her poems, ballads, novels, or juvenile tales, of which noems, ballads, novels, or juvenile tales, of which she wrote many. By means of translations she first made the works of F. Bremer and Hans Andersen known to the English public. She wrote for the annuals, for the People's Journal, Horeit's Journal, Chambers's Journal, &c. A mension was bestowed upon her in 1879 by Lord Beaconsfield. She died at Rome, January 30, 1888, and her remains were laid beside those of her husband in the cemetery of Monte Testaccio. One critic has justly said that W. Howitt and his wife are inseparably associated with all that is enchantare inseparably associated with all that is enchanting in rural England. In their poems, their novels, and the stories of their country rambles they made themselves the exponents of nature, blending the idealism of poetic fancies with pictures that have the realism of photographs. In politics William Howitt was an extreme Radical. Joint productions of William and Mary Howitt were the Forest Minstrel (1827), Desolation of Eyam (1827), Book of the Seasons (1831), Literature and Romaness of Northern Europe (1852), Stories of English Life (1853), and Ruined Abbeys of Great Britain. William Howitt's chief works, besides contributions to newspapers and magazines, were History of Priest-craft (1833); Pantiku (1835); Rurul Life in England (1837); Visits to Remarkable Places (1838; second series, 1841); Colonisation and Christianity (1838); Boy's Country Book (1839); Student Life of Germany (1841); Homes and Haunts of the Poets (1847); Land, Labour, and Gold (1855); Illustrated History of England (6 vols. 1856-61); History of the Supernatural (1863); Discovery in Australia, Tasmania, and New Zealand (1865); Mad War Planet, and other Poems (1871). See Mary Howitt, an Autobiography, edited by her daughter, Margaret Howitt (2 vols. 1889).

Howitzers (Ger. Haubitzen) are guns which came into use early in the history of field artillery, as portable instruments for discharging shell into a hostile force. As for this purpose no great range was necessary, a small charge of powder sufficed; and the howitzer could be made, in proportion to its large boro, extremely light. For modern howitzers, see Cannon.

Howler, Howling Monkey, or Stentor (Mycetes), a genus of Central and South American monkeys, remarkable for the dilatation of the hyoid bone into a hollow drum, which communicates with the larynx, makes a conspicu-

ons external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds, which can be heard at least two miles away, and to which all their names refer. They live chiefly among the branches of trees, and take extraordinary leaps from one to another, taking hold by the tail like most of the American Platyrrhine monkeys, as readily as by the hands, and often swinging by it alone. They are gregarious, and unite their voices in concert, so as to produce a most deafening noise; this is what Humboldt and others say, but according to Wallace it is only one individual at a time which causes all the sound. The monkeys of this genus have a low intelligence, and their brain structure bears out this view. A howler was first brought alive to Europe and exhibited at the Zoological Cardens, London, in 1863. There are apparently not more than six species.

Howrah, or HAURA, a town of India, with growing manufactures, on the right or west bank of the Hooghly, directly opposite to Calcutta, of which it is practically a suburb. It is connected with Calcutta by a floating bridge (1874), and is the Bengal terminus of the East Indian Railway.

Pop. (1872) 97,784; (1881) 105,628.

Howson, John Saul, dean of Chester, was born in 1816, and in 1837 took a double lirst-class at Cambridge. Taking orders eight years later, in 1849 he became principal of the Liverpool College, and in 1867 dean of Chester. The complete restoration of the cathedral was in great measure due to his energy and devotion. He died 15th December 1885. With Conybeare he wrote the well-known Life and Epistles of St Paul (1852).

Howth, a peninsula on the east coast of Ineland, forming the north side of the Bay of Dublin, terminates in a lofty cliff, at the foot of which nestles the village of Howth, the chief fishing-

station on that part of the coast.

Hoxton, a district of London, partly in Hackney, but mainly in Shoreditch; the Hoxton division being part of the parliamentary borough of Shoreditch.

Hoy (Scand. Hoey, 'high island'), one of the Orkneys, 11 mile SW. of Mainland or Pomona. It is 131 miles long, 3 furlongs to 61 miles broad, and 53 sq. m. in area. Unlike the rest of the group, Hoy rises abruptly from the sea, with stupendons cliffs that attain 1140 feet in Bracbrough or St John's Head, and 595 in Bervy Hill; inland are Cnilags Hill (1420 feet) and the Ward Hill (1564), commanding a splendid panoramic view. The rocks represent both the Upper and the Lower Old Red Sandstone. Near the south end is the fine natural harbour of Long Hope (5½ × 1½ miles). The 'Dwarfie Stone' is a sandstone block, 28 feet long, 14½ broad, 6½ high, with a chamber hollowed out of it; and the 'Old Man of Hoy' is an insulated pillar of rock, 450 feet high. Pop. (1841) 1436; (1881) 1380. See Tudor's Orkneys (1883).

Hoy, a small coasting vessel, differing little, if at all, from the sloop or smack, and often used for conveying goods from a large vessel to the shore.

Hoylake, a small watering-place of Cheshire, at the extremity of Wirral peninsula, 8 miles by rail W. of Birkenhead. It has a celebrated golf-links, opened in 1869. Pop. of district, 2519.

Hoyle, EDMOND, the creator of whist, was born in 1672, and is said to have been educated for the bar. Little is known about his life, except that he lived for some time in London, writing on games and giving lessons in whist, and died there on 29th August 1769. In 1742 he published his Short Treatise on Whist, containing the laws and some rules, for which he is said to have received

£1000, and which in 1763 reached a 13th edition. See Whist, and ten articles in Notes and Queries for 1889.

Hrabanus. See RABANUS MAURUS.

Hradschin. See Prague.

Hualla'ga, a river of Pern, rises near the Cerro de Pasco, over 14,000 feet above the sea, flows north on the cast side of the Central Cordillera, breaks through the range at the gorge of Chasuta, and enters the Marañon. Its total length is about 650 miles; it is navigable as far as Yurimaguas, above which are falls and rapids.

Huamanga. See Ayacucho.

Huanaca, or Guanaco (Lama huanacos; see Llama), a species of the same genus with the llama, vicuña, and alpaca, of which some naturalists suppose it to be the wild original. It is found not only on the Andes, but throughout great part of Patagonia. It is of a reddish-brown colour, the eas and hind-legs gray. It generally lives in herds of ten to forty, and is very quiek-sighted and wavy; although such is the strength of its curiosity that hunters attract the herds within easy reach of their rifles by lying down on the ground and kicking their fect in the air. Like its congeners, the Huanaca is extremely sure-footed on rocky ground.

Huancaveli'ca, a department of Peru, lying entirely within the Cordilleras, with an area of 8710 sq. m. Pop. 104,155. The climate is cold and raw on the mountains, where sheep, cattle, and llamas are herded, and hot in the deep valleys, where sugar is grown. The chief riches are in the mines, especially of silver and quicksilver.—The capital, Huancavelica, 150 miles SE of Lima, is a dreary unining town in the sierras, with a pop. of 4000, engaged in working some famons quicksilver mines close by.

Huan'uco, a department of Peru, with an area of over 13,000 sq. m. Mining and agriculture are the chief industries. Pop. 78.856.—The capital, Huanuco, lies in a lovely valley on the Huallaga, amid plantations of collee and sugar. It is a bishop's see. Pop. 5300.

Huber, François, author of a book on the habits of bees, was born at Geneva, July 2, 1750, and died, 22d October 1830, at Pregny near his birthplace. At an early age he lost his eyesight, but with the assistance of his wife and an intelligent domestic he conducted a number of original and important observations on the habits of bees. His book first appeared as Lettres a Ch. Bonnet (1792); it was reprinted in 1796, and again in 1814, under the title of Nouvelles Observations sur es Abeilles. In his later years he derived important aid from his son, Jean Pierre (1777–1841), who wrote a valuable treatise on the Habits of Ants (1810).

Hubert, Sr., Bishop of Liege, was son of Bertrand, Duke of Gnienne, and was born in 656. He lived a luxnrions and worldly life, lirst at the conrt of the Frankish king Theoderich, next under Pepin of Heristal, but after the death of his wife retired from the world into a monastery, on the advice of Bishop Lambert. Afterwards, when on a pilgrimage to Rome, he was made by Pope Sergius I. Bishop of Tongern, and in 708 succeeded his master, Lambert, in the see of Maestricht and Liége. He died in 727, and was afterwards canonised; his festival falls on November 3. He has been patron of orders of knighthood in Bavaria and Bohemia. See the books by Fétis (1846), Des Granges (1872), and Heggen (1875). In legend and in art, since the 15th century, St Hubert appears as a mighty hunter who was startled into repentance when hunting on Good Friday by the sudden appearance of a stag bearing between his horns a radiant crucifix.

At once he renounced hunting and all worldly pleasures, and became after his canonisation the patron saint of lunters. His aid is especially efficacious for persons bitten by mad dogs and those possessed with devils. See H. Gaidoz, La Rage et St Hubert (1887).

Hubertusburg, formerly a royal lunting-seat of Saxony, 25 miles E. by S. from Leipzig, built in 1721 by Prince Frederick Angustus, afterwards King Angustus III. of Poland. It was much injured during the Seven Years' War; and there on 15th February 1763 was signed the treaty by which that war was ended. Since 1840 the buildings have served as a prison, a hospital, an asylum for the insane, and a refuge for idiot children.

Mubli, a town of Dharwar in the presidency of Bombay, stands on a good road leading to Karwar on the Malahar coast, 102 miles to the south-west. It contains (1881) 36,677 inhabitants, and is one of the principal cotton-marts in that section of India.

Hibner, Rudolf Julius Benno, German painter, was born at Ocls, in Silesia, 27th January 1806. He studied at Düsseldorf, to which school of painting be belongs. In 1841 he was appointed professor of Painting in the academy at Dresden, and was director of the picture-gallery from 1871 to 1882, in which year he died, 7th November, at Loschwitz, near Dresden. Among his pictures are 'Job and his Friends,' 'Charles V. in Sau Yuste,' 'Frederick the Great in Sausonci,' 'The Golden Age,' and 'The Dispute between Luther and Dr Eck.' He also designed glass paintings, including some for the crypt of Glasgow Cathedral.

Huc, Evaniste Régis, French missionary and traveller, was born at Toulouse, Angust 1, 1813. Almost immediately after his ordination he joined in 1839 the missionary expedition of his order, the Lazarist Fathers, to China. In 1844 Hue, in company with Père Gabet and a single native convert, set out with the intention of penetrating to the unknown hand of Tibet, beyond the terrifule desert of Gobi. But it was not until January 1946 that they succeeded in reaching Libassa, the capital of Tibet, and the residence of the Dalai Lama. And scarcely had they settled in that city and started a mission, when an order for their immediate expulsion from the country was obtained by the Chinese resident in Lhassa. They were conveyed back to Canton. Hue's health having completely broken down, he returned to France in 1852. His Asiatic experiences are recorded in Souvenirs d'un Voyage dans lu Tantavie, le Thibet, et la Chine pendant les Années 1844-46 (2 vols. Paris, 1850; Eng. trans. by W. Hazlitt, 1851-52), and L'Empire Chinois (2 vols. 1857-58; Eng. trans. 1857-58). The strangeness of some of the incidents recorded in the book on Tibet provoked some degree of incredulity; but the testimony of later travellers in the same regions fully corroborates the truth of Hue's narrative. He died at Paris in March 1860.

Huckaback, a coarse kind of linen cloth, figured somewhat like damask, and usually employed for table cloths and towelling.

Huckleberry. See Whortleberry.

Huddersfield, a 'clothing town' in the West Riding of Yorkshire, a municipal and county borough, 26 miles NE. of Manchester, 15 S. of Bradford, 17 SW. of Leeds, and 189 NNW. of London. Well built of stone and regular, it occupies a considerable extent of high ground, sloping down to the left bank of the Colne, which here receives the Holme; and it owes its rapid extension to its situation in a rich coal-district, to its abundant water-power, and to its transit facilities by

rail and canal. Among the chief edifices are the circular cloth-hall (1768-80); the railway station (1848), with a marble statue of Peel (1875) before it; the classical town-hall (1880); the chamber of commerce (1880); the mechanics' institute (1861); the market-hall (1880); the infirmary (1831-74); Huddersfield College (1838), affiliated to the London University; and the Collegiate School (1839). Some of the churches, too, are noteworthy in an architectural view, St John's (1853) having been designed by Butterfield, and St Thomas' (1859) by Sir G. G. Scott. The Beaumont Park, 21 acres in area, was opened by the Duke of Albany in 1883, and there also is Greenhead Park of 26 acres. Huddersfield is the chief seat in the north of England of what is called the 'fancy trade,' and every description of plain woollen goods is also manufactured; whilst other industries are cotton and silk spinning, iron-founding, machine-making, &c. Roman remains have been found here; but Huddersfield has no history to speak of. In 1750 Bishop Poeocke described it as 'a little town.' It was enfranchised by the Reform Act of 1832, and made a nunnicipal borough in 1868, the boundary having been greatly extended the year before. Pop. (1861) 34,877; (1871) 74,358; (1881) 87,146; (1888) 91,419.

Hudson, a river in New York, and one of the most beautiful and important in America. It rises in the Adirondack Mountains, 4326 feet above the level of the sea, its head-streams the outlets of many mountain-lakes. At Glen's Falls it has a fall of 50 feet, and soon after, taking a southerly course, runs nearly in a straight line to its mouth, at New York city. It is tidal up to Troy, 151 miles from its mouth, and magnificent steamboats ply daily between New York and Albany. Below Newburg, 60 miles from New York, the river enters the highlands, which rise abruptly from the water to the height of 1600 feet. Here historical associations add to the interest of scenery of singular beauty and grandenr: here was the seene of Arnold's treason and of André's fate; and at West Point, the seat of the United States military academy, 8 miles below Newburg, are the ruins of Fort Putnam, unit during the war of independence. Emerging from the highlands, the river widens into a broad mountain-lakes. At Glen's Falls it has a fall of 50 from the highlands, the river widens into a broad expanse called Tappan Bay, which is 44 miles wide and 13 long. Below, on the right bank, a steep wall of trap rock, called the Palicades, rises from the river's brink to a height of 300 to 510 feet, and extends for nearly 20 miles to the upper portion of the city of New York. The river from here is known as the North River, and is from 1 to 2 miles wide; and after passing between New York and Holoken and Jersey City, it falls into New York Bay. Its whole length is about 350 miles, and its principal tributaries are the Sacondaga, Mohawk, and Walkill. The Hudson has valuable shad and sturgeon fisheries. The Hudson River Railway, connecting New York with Albany, runs along the east bank. The river is connected by canals with Lakes Erie and Champlain, and with the Delaware River. In 1874 a tunnel was undertaken between New York and Jersey City (see TUNNEL). The river is named from the English navigator who explored it in 1609. Robert Fulton's first successful experiment in steamboat navigation was made on this river in 1807. See 'Our River,' by John Burrongles, in Scribner's Monthly (August 1880), and the Panorama of the Hudson (both banks, as far as Albany), published by the Bryant Literary Union (New York, 1888).

Hudson, eapital of Columbia county, New York, stands on the left bank of the Hudson River, and on the Hudson River Railroad, 116 miles N. of New York eity. It extends along a high ridge ending in a bold promontory, at whose foot are the wharves; its former West Indian trade and its whale-fisheries have been abandoned, but it has still an active river-trade, still an active river-trade. Hudson has a fine court-house, a city hall, several foundries and blastfurnaces, and manufactures of fire-engines, paper, leather, flour, &c. Pop. 8670.

Hudson, George, the 'Railway King,' was born at York in 1801. There he subsequently carried on business as a linen-draper. Inheriting from business, and hegan to interest himself in local politics and in railway speculation. He became the ruling spirit of the York and North Midland Railway Company; and his ventures and schemes for annalgamating various railway companies were attended with extraordinary success. Hudson was elevated to the dictatorship of railway speculation. Everything he touched turned to gold. He hought large estates, was three times elected lord mayor of York, and was sent to parliament by the electors of Sinderland (1845). But the railway mania of 1847-48 plunged him into ruin. He was accused of having 'cookel' the accounts of companies with which he was conneeted, and of having paid dividends out of capital. Legal proceedings were instituted against him, and his suddenly-acquired gains were almost entirely swept away. The constituency of Sunderland, however, continued to elect him as their representative until March 1859. He afterwards lived in comparatively narrow circumstances, and died in Landon, December 14, 1871.

Hadson, Henry, a distinguished navigator, of whom we know nothing before April 1607, when we find him starting, in a small vessel with ten sailors, on his first unfortunate voyage for the discovery of a north-east passage. In his second voyage in 1608 he reached Nova Zembla. He undertook a third voyage in 1609 from Amsterdam, at the expense of the Dutch East India Company. Civing up all hope of linding a portheast passage. Giving up all hope of linding a north-east passage, he sailed for Davis Strait, then steered southwards in search of a passage, discovered the month of the river which now bears his name, and sailed up its waters for 150 miles. He sailed upon his last voyage in April 1610, in the Discorric of 70 tons, and reached Greenland in June. Steering westward, he discovered the strait now known as Hudson Strait, and passed through it, and entered the great bay which has received the name of Hudson Bay. Although very insufficiently supplied with provisions, he resolved to winter in these desolate regions, in order to prosecute his dis-eoveries further in the following spring. The food fell short, and the men, dissatisfied with Hudson's determination to continue the voyage, mutinied, and east him adrift in a shallop, with eight others, on Midsummer Day 1611. The real ringleaders perished miserably in a scuffle with savages, and the See George Asher's Henry Hudson, the Navigator (Hakluyt Society, 1860).

Hudson Bay, a gulf, or rather inland sea, in the north-east of North America, is completely landlocked except on the north, where Southamp-ton Island and Fox Channel lie between it and the Arctic Ocean, and where Hudson Strait, running 500 miles south east, connects it with the Atlantic. Including its south eastern extension, James's Bay (q.v.), it measures about 1000 miles in length and 600 in average width, and has an area of some 500,000 sq. m. The eastern shore, called the East Main, is for the most part rocky, and is fenced with several small islands; the western shore, the West Main, is generally flat. This sea, the great drain-age reservoir of the Canadian North-west Terri-

tories, receives the precipitation from over an area of nearly 3,000,000 sq. m. Of the numerous rivers which bring down this water only two need be mentioned-the Churchill, whose deep and narrow month forms the best harbour on the shores of Hudson Bay, and the Nelson, of whose total course of 400 miles only 70 or 80 are navigable. Hitherto the only business that has been to any extent developed in this region has been the fur trade of the Hudson Bay Company (q.v.), though fish-oil has also been exported. Of late years, however, a movement has been on foot for opening up a direct communication from England with Manitoba and the North-west of Canada by way of Had-son Bay and Strait. The scheme provides for a railway from Winnipeg to Fort Nelson on the bay, a distance of 650 miles, of which 40 miles were con-structed by the end of 1890. The chief objection to the project is that, although the bay is quite easy to navigate, and is only covered with ice in winter to a distance of about 10 miles from the shore, yet the passage of Arctic drift-iee through Fox Channel and Hudson Strait in early summer renders the successful navigation of the latter waterway somewhat uncertain. The strait can, however, be traversed by vessels on an average for about three months annually. This route would effect a saving of 775 miles as compared with the route by way of Montreal, and of 1130 as compared with that by New

See Captain W. Coats's (teography of Hudson's Ban, 1727-51, edited by J. Barrow for the Hakluyt Society (1852); Dr Robert Bell in Proc. Roy. Geog. Soc. (1881); W. Shelford in National Review (1886); and C. R. Markham in Proc. Roy. Geog. Soc. (1888).

Hudson Bay Company, a corporation formed in 1670 by Prince Rupert and seventeen noblemen and gentlemen for importing into Great Britain furs and skins obtained by barter from the Indians of North America. The company was invested with the absolute proprietorship and the exclusive right of traffic over an undefined territory, which, under the name of Rupert's Land, comprised all the regions discovered, or to be discovered, within the entrance of Hudson Strait. This was taken as meaning all lands that drained into Hudson Bay or Hudson Strait. For more than a century, however, the grantees confined themselves to the coast districts. Down to 1713 they had also to contend against the hostile acts of the French of Canada, who destroyed their forts, ruined their goods, and captured their ships. But after Canada passed from the French to the British in 1763 adventurers from the great lakes began to penetrate, in quest of peltry, far up the Saskatchewan towards the Rocky Monutains. And their enterprises, coming to be prosecuted with more systematic energy, led in 1783 to the formation of the North-west Fur Company of Montreal. After a period of stubborn competition, the Hudson Bay Company coalesced with its formidable opponent in 1821. The sphere of their labours was now practically coincident with all British North America, between the Pacific and Atlantie, and the Arctic Ocean and the United States. In 1838 the Hudson Bay Company again acquired the sole right of trading for itself for a period of twenty-one years; on the expiry of this concession the fur trade in British North America was thrown open to the world. Finally, in 1869, the company made a formal cession to the British government of whatever territorial claims remained, receiving an indemnity of £300,000 from the Dominion of Canada, to which the whole territories were forthwith annexed. It was, however, stipulated that the company should retain all its forts, with 50,000 acres and one-twentieth of all the land lying within the 'fertile belt' from the Red River to the Rocky Mountains. Besides still

carrying on the business of collecting furs, the company now derives a large income from the sale of these conceded lands.

See Fitzgerald's Examination of the Charter and Pro-ceedings of the Hudson's Buy Company, and Montgomery Martin's Hudson's Buy Company's Territories and Van-couver's Island, both published in 1849.

Hué, the capital of Annam, 10 miles from the month of the Huc River, or Transgien. In 1801 it was strongly fortified by French officers. The heart of the city is occupied by the palace; much of the rest of it is composed of much lints. Since before Annam became a French protectorate, there has been a French resident at Hue; and since the treaty of Huć in 1884 there is a French garrison in Thuangu, the port of Huć. There is little industry in Huć, which has a population of 30,000 (with subarbs, 50,000), including a number of Chinesc. See Annam.

Hue and Cry, a phrase derived from the old process of pursuit with horn and voice, used in old English law to describe the pursuit of felous. Whoever arrested the person pursued was pro-tected; and it was the duty of all persons to join in a line and cry. The Hue and Cry, a police gazette for advertising criminals, was established

in 1710.

Hueffer, Francis, musical critic and Provençal scholar, was born at Münster, in Westphalia, in 1845, studied at Berlin, Leipzig, and Paris, and settled in London in 1869. He soon became an authority on music, was unsical critic of the Times, and was recognised as the champion in Britain of Wagner and Wagnerian music. In 1869 he edited the Provenced poet Guillem de Cahestanh, and in 1878 published The Troubadours: a History of Provenced Life and Literature in the Middle Ages. Two works on Wagner were found in a provincial that the in the Clear from his pen—oue in 1874, the other in the 'Great Musicians' series, in 1881. He died January 10,

Muclya, a thriving town of Spain, situated near the confluence of the Odiel and the Tinta, 68 miles by rail WSW. of Seville. Fishing and the plaiting of esparto grass are the chief industries. Huelva is the port for the important Rio Tinto copper-mines, in British hands, and a shipping place for wine. An iron pier was creeted in place for wine. An iron pier was erected in 1880-90. In the two years 1886-87 there were shipped from Huelva 1,813,827 tons of copper ore, valued at £2,539,974, and 180,134 tons of lead, valued at £2,310,428. Pop. 18,195.—The province of Huelva has an area of 3913 sq. in., and a pop. (1887) of 254,831.

Hnerta, VICENTE GARCIA DE LA, a Spanish poet and critic, was born in 1730 at Zafra, in Estremadura, but spent the greater part of his life in Madrid, where he was head of the Royal Library, and where he died on 12th March 1787. His tragedy of Raquel (1778), founded upon the story of the Love of King Alfonso VIII. for the fair Jewess Rachel, was received with great enthusiasm, and is still esteemed one of the best of modern Spanish tragedies. Huerta was a zealous but not always consistent opponent of the prevailing Gallicism of his own day. As a lyric and dramatic poet he shows great command of language and versification. His poems were published in two volumes in 1778-79, and again in Biblioteca de Autores Españoles (vol. lxi.). Huerta edited the Teatro Español (17 vols. 1785-86), a collection of the best works of the older Spanish dramatics. works of the older Spanish dramatists.

Huesca, a very old and picturesque town of Spain, on the Isnela, 55 miles by a branch-line NE. of Saragossa. Among its chief buildings are the cathedral (1400-1515), a beautiful Gothic edifice; the Romanesque church of San Pedro (1150-1241);

the university, founded in 1354 by Pedro IV.; and a former palace of the kings of Aragon. The Osca of the Romans, where Sertorius was unreleved in 72 E.C., Huesca afterwards became famous as a seat of learning. Tanning and manufactures of linens are here carried on to some extent. Pop. 13,043.—The province of Huesca has an area of 5848 sq. m., and a pop. (1887) of 254,958.

Huescar, a town of Spain, 75 miles NE. of Granada. Pop. 7760.

Huet, PIERRE DANIEL, French scholar and polymath, was horn at Caen, February 8, 1630. He was educated in the Jesnit school of Caen, and became a zealous pupil of Descartes and of Bochart. The latter he accompanied on a visit to Stockholm in 1652, when he discovered and transcribed the MS. of Origen which was the basis of his celebrated edition of that father fifteen years later. On his return home he gave himself up cutirely to study. In 1661 he published his essay De Interpretatione. In 1670 he was appointed with Bossnet tutor of the dauphiu, and in the same year wrote his Essai sur l'Origine des Romains. took an active part also in preparing the Delphin cdition of the classics. Having in 1676 taken holy orders, he was successively abbot of Annay (1678), Bishop of Soissons (1685) and Avranches (1692), and abbot of Fonteuny (1699). In 1679 appeared and f lis most important books, Demonstratio Evangelica. In 1701 he withdrew to the Jesnits' house in Paris, where he died, 20th danuary 1721. During his episcopal career Huet published a couple of books on the Cartesian philosophy, another on reason and faith, and another on the site of the earthly paradise. To his latest years belong Histoire du Commerce et de la Navigation des Ancients (1716), and his autobiographical memoirs (1718). His works were published in a collected form in 1712, and a volume of Huctiana appeared in 1722. In this latter year Huet's Truité de la Fuiblesse de PEsprit Humaine, which excited much controversy, first saw the light. See his Latin autobiography (1713), the French Life by Bartholomess (1850), and an article in the Quarterly, 1855.

Hnfeland, Christoph Wilhelm, German physician, was born on 12th August 1762, at Jangensalza, in Thuringia. After studying at Jena and Göttingen, he was appointed physician to the court of Weimar, where his father and his grandfather had previously filled the same office. In 1793 he was appointed professor of Medicine at Jena, and in 1798 went to Berlin to preside over the medical college there and the Charité Hospital. On the foundation of the university of Berlin in 1809 he became one of its professors. He died 25th August 1836. He had a very high reputation for skill as a physician, was greatly esteemed for his intellectual abilities and his fine character, and founded a number of benevolent societies and institutions. Of his published works societies and institutions. Of his published works the most notable were the famous Makrobiotik, or the art of prolonging life (1796; 8th cd. 1889), which was translated into almost all the languages of Europe; a work on the physical education of the young (1799; 12th ed. 1875); and *Enchiridion* Medicum (1836; 10th ed. 1857).

Hug, Johann Leonhard, Catholic theologian, was born at Constance, June 1, 1765, entered into priest's orders in 1789, was appointed a professor of Theology at Freiburg in 1791, and died there, 11th March 1846. The most important fruit of his biblical researches was his Introduction to the New Testament (2 vols. 1808), which was translated into most of the European languages (Eng. by D. G. Wait, 1827).

Huggins, William, astronomer and spectroscopist, was born in London on 7th February 1824.

Whilst still a youth his mind was attracted to the study of chemistry, magnetism, and allied branches of physical science. In 1852 be was elected a member of the Microscopical Society, and for some years laboured at the study of physiology, animal and vegetable, with the microscope. But having in 1855 built for his own private use an observatory at Upper Tulse Hill, near London, he hegan what proved to be the principal work of his lifetime—the study of the physical constitution of stars, planets, comets, and nehulæ. By researches on the smis spectra and the spectra of certain comets, he ascertained that the luminous properties of the former are not the same as the luminous properties of the latter. Since 1875 he has been engaged photographing the ultra-violet parts of the spectra of the stars. He has also determined the amount of heat that reaches the earth from some of the fixed stars. Mr Huggins was elected a Fellow of the Royal Society in 1865. He was twice awarded the Royal Society in 1865. He was twice awarded the medal of the same society and twice the gold medal of the Royal Astronomical Society. 1874 he became corresponding member of the Paris Academy of Sciences, and three years later corresponding member of the Royal Society of Gottingen. From 1876 to 1878 he was president of the Royal Astronomical Society.

Hugh, Sr, of Avalon, Bishop of Lincoln, was born of noble family at Avalon in Burgundy about 1135. On his mother's death his father entered a priory of regular canons at Villarbenoit, carrying with him the boy, then but eight years old. At niueteen he was ordained deacon, and was already remarkable for his holiness of life and ascetic ansterity. Ere long he was attracted by the severer discipline of the Grande Chartrense, and thither he repaired, although he had taken an oath to his superior not to do so. Here he remained ten years, received his priest's orders, and was for his practical ability appointed bursar to the monastery. His fame came to the ears of Henry II., who prevailed upon him to accept the government of the struggling Carthusian monastery at Witham in Somersetshive, and summoned him hence in May 1186 to fill the bishopric of Lincoln. For fourteen years he governed his diocese with great wisdom and vigonr, retiring every year a short time to Witham for his soul's health. His unworldly holiness gave him great influence, not only over Henry II., but also his successors Richard and John. He did not leave off his frank outspokenness of speech and his quick wit even in the presence of the king. Withat his charity was so remarkable that even the Jews of Lincoln are said to have wept at his funeral. All his life he had been notable for his love of birds, and at his residence at Stow, near Lincoln, he had a pet swan whose affection for its master appeared to beholders to be more than natural. The swan usually appears in representations of the saint. Soon after his accession to the episcopal throne he had begun with vigour the rebuilding of his cathedral, and he lived to see the completion of the choir and eastern transepts. But indeed, with the exception of the presbytery, the entire church, as it now dominates Lincoln, was conceived in the mind of Hugh's architect, and gradually perfected under his successors. Hugh visited his native country in 1200, and on his return journey was seized with illuess, and died at London 16th November 1200. He was canonised in 1220, and for long miracles were wrought at his tomb, and his cult was almost as popular as that of St Thomas in the south.

Both the Metrical Life of St Hugh of Avalon (1860) and the Magna Vita S. Hugonis (1864), the latter most likely written by his domestic chaplain, Adam, abbot of Evesham, were edited by the Rev. J. F. Dimock. A Life by Giraldus is printed in vol. vii. (1877) of the

works of Giraldus Cambrensis. See also Canon Perry's Life of St Hugh of Avulon (1879).

Hugh of Lincoln, a boy supposed to have been murdered by the Jews of Lincoln, as told both in Euglish traditional ballads and early chronicles. Professor Child (No. 155) gives no fewer than eighteen versions of ballads on this theme, which agree marvellonsly even in detail. A group of boys playing at foot or at hand ball are joined by the young Hngh or Sir Hngh, who drives the ball through a Jew's window, is enticed into the honse by the Jew's daughter, cruelly murdered and flung into a well, from which he speaks miraculonely, whereby the murder is discovered. story of Hugh of Lincoln is told in the Annals of Waverley, under the year 1255, by a contemporary writer. Here the boy is tortured by the Jews, and finally crucified in contempt of Christ. His body is discovered by miraculous means, and eighteen Jows are hanged for their share in the crime. Additional circum-tances are found in Matthew Paris. The story occurs simultaneously in several Anglo-French ballads; and Chancer's Prioreses Telle is an artistic elaboration of the theme.

We find more or less circumstantial versions of the same story not only at Lincoln, but at Norwich, Gloucester, London, and Northampton; at Blois, at Saragossa, and Valladolid; at Frisingen and Zurich; at Frague and Cracow, Pavia and Venice, and very frequently among the German peoples, as at Vienna, Erfurt, Magdelurg, Mainz, Munich, Breslau, and Ratisbon. Besides the desire to deride the Passion, an additional notive was invented, that the Jews sought to obtain blood for use in the Paschal rites—a charge ridiculously at variance both with Jewish precept and practice. This singular notion has survived persistently for over 600 years, and has formed a pretext for cruel and shameful wrong down to our own day. It is still a firmly-held popular notion in Russia, Hungary, at Smyrna and Alexandria; indeed it was only so late as August 1883 that fifteen Jews were acquitted after over a year's imprisonment for the alleged kidnapping of a young girl at Tisza-Eszlár, and that the good Christians of Budapest plundered the Jewish shops in their disappointment at the verdict.

See the Chancer Society's Originals and Analogues of Chancer's Canterbury Tales for 1875 (No. 10) and 1876 (No. 14), and part v. of Professor Child's English and Scottish Popular Ballads (Roston, 1888).

Hugh Capet. See Capetian Dynasty,

Hughenden (locally Hitchendon), a parish of Buckinghaushire, among the Chiltern Hills, 2 miles N. of High Wycombe. Hughenden Manor, a large brick three-story mansion, mostly modern, was nurchased before 1847 by Benjamin Disraeli, Earl of Beaconsfield. It is rich in interesting portraits; and in its terraced gardens are trees planted by Queen Victoria in 1877 and the Prince of Wales in 1880. The ancient parish church, much restored in 1874, contains a monument to the earl, erected by the Queen; and in its vanlt he lies buried by the side of Lady Beaconsfield.

Hughes, Thomas, author of Tom Brown's School-days, second son of John Hughes, Esq., of Domington Priory, near Newbury, in Berkslire, was born at Uflington, Berks, October 23, 1823. He was educated at Rugby under the celebrated Dr Arnold; entered Oriel College, Oxford, in 1841, and took his degree of B.A. in 1845; was called to the bar at Lincoln's Inn in 1848, and became a member of the Chancery Bar. In 1856 he gave to the world Tom Brown's School-days, a vivid and truthful picture of life at Rugby, evidently written from the author's own boyish impressions. It is the highest praise to say that it admirably supple-

ments Stanley's life as a picture of the greatest of modern teachers. It was followed in 1838 by The Scouring of the White Horse; in 1861 hy Tom Brown at Oxford, in which the mental history of his hero is continued, with sketches of eollege life and incidents; and in 1869 by Affred the Great. Hughes pursued meanwhile the practice of the law, hecame Q.C. in 1869, and a County Court judge in 1882. He associated early with Maurice and Kingsley in their work of social and sanitary reform among the London poor, and while he had gained the confidence and good-will of the working-classes by his endeavours to promote a better understanding between masters and men, and by teaching the latter the value of co-operation, he has never failed courageously to rebuke the narrow prejudices and mischievous views held by certain members of trades-unions. At the general election for Lambeth in 1865 he was placed at the head of the noll. He was returned for Frome in 1868, which he continued to represent till 1874, and always took a prominent part in debates relating to the combinations of trades-unions and the law of master and servant. In 1880 he assisted in founding a settlement in the United States, an account of which he published under the title of Rugby, Tennessee (1881). He has also written Memoirs of a Brother, G. C. Hughes (1873), and Lives of Daniel Macmillan (1882) and Bishop Fraser (1887).

Hugli. See Hooghly.

Hugo, Victor Marie (1802-85), was the son of a Lorrainer and a Breton, and was born at Besunçon. His father, General Hugo, was on active service, so that his carlier years were mostly spent in the track of the emperor's armies. was educated partly in Paris at the Fenillantines (1809-11, 1813-15), partly in Madrid (1812), and partly at the Ecolo Polytechnique, where he read partly at the Ecolo Polytechnique, where he read nathematics and practised poetry. At fourteen he produced a tragedy; at fifteen he went near to winning a prize at an Académie competition; and at twenty, when he published his lirst set of Odes et Ballades (1822), he had thrice been victor at the Floral Games of Toulouse. The next year, being by this time a married man and the enfant sublime of M. de Chateaubriand, he published his Hans d'Islande (1823), that wild and whirling romance of an impossible Iceland; and whirling romance of an impossible Iceland; and followed it up with Buy Jargal (1824), a second set of Odes of Ballades (1826), and the famons Cromwell (1827), thanks to which lasta tragedy even then impossible to act and now almost as difficult to read—he became the nost conspicuous figure in aesthetic France. For Romanticism-that protest in action against the effete and hidebound conventions of the age of Louis XIV.—was now by way of being an accomplished fact; and the preface to Cromwell was greeted with an enthusiann of approval on the one hand and of detestation on the other in these days not easy to understand. In its way, indeed, it is a document of singular importance in literary history. It is largely compacted of paradox and antithesis no doubt; and no doubt its premises are mostly dubious and its conclusions not more than fantastic. But it asserted the artist's right to be as Shakespearian—that is, as lawless—as he pleased, and it was so completely a declaration of independence, and a decree of emancipation, that, whatever happens, the literature of France can never wholly recover from its effect.

The time indeed was big with revolution and with change, and Hugo's manifesto was accepted by the Romanticists with the solemnity of absolute conviction, so that he instantly took his place by right of genius and authority at the head of the literary host. He was fully equal to the charge

of course; for while he was far and away the greatest artist in words that modern France has seen, he was also very careful and curions in the work of 'engineering a reputation,' and contrived to take himself and his function so seriously that to his followers he was not much below divinity itself. It is said that he made himself a forehead; and it is certain that while M. Rodin's magnificent bust of him is far less brow—enormous, radiant, 'prone with excess of mind'—appears and reappears in contemporary caricature with all the persistency and more than the effect of Gillray's view of the 'Bottomless Pitt,' It is certain, too, that the first sketch of his life and work that got into print was written in his own honse, and was the work of his own wife; and as Mme. Hugo never wrote again, it is legitimate to argue that the hero may very possibly have lent a hand to the epic. But he never have lent a hand to the epic. ceased from achievement; and his achievement was inevitably that of a great artist in speech. In 1828 he published his *Orientales*, wherein he revealed himself for such a master of rhythms, such an inventor in style, such an adept in the mystery of the use of words as France had never seen. The year 1830 was the great year of Hermani—the first in fact and the second in time of those 'five-act lyries' of which Hugo's drama is In so far as it relates to dramacomposed. material, structure, amount, movement, the prematerial, structure, amount, movement, the presentation of emotion in action—the question had been settled now and for all time by Dumas the year before; but Dumas was not a writer in the sense that Hugo was, and the battle of style was still to fight, and the battlefield was the Théâtre-Français, and the casus belli was Hernani. It is a built out to write the mount of the research of the resear is so victorions and the diction is so gorgeous, that even now it takes one time and patience and a certain familiarity to see that, while constructed in the formula of *Henri Trois et sa Cour*, In those days men had neither time nor patience, while as for familiarity! . . . It was enough that to one side the verse was incomparable, and that to another it was the Accuract Thing. As Hugo took care to pack as much of the house as he could get mudo over to him with Romanties, and as on the other part the Classicists were to the full as eager for the quarrel, the question of what is and what is not style was argued for many nights on end with a vehonence—sometimes attaining to the inspiration of assault and battery—which has made 1830, as the year of *Hornani*, a sacred date— as who should say a species of Hegira in the amals of Romanticism.

In 1831 Hugo published Notre Dame de Paris, a pretentious but picturesque and moving historical romance in which he enters into competition with Sir Walter and comes badly off, and Les Feuilles d'Autonne, a sheaf of lyrie and contomplative verse in which is included some of his best pootry; and brought out his best play, Marion Delorme, at the Théâtre-Français. In 1832 he produced Le Roi s'annuse, which was interdicted after the first night, and of which the best that can be said is that it is superbly written and that it has gone the round of the world as Rigoletto. The next year was that of Lucrèce Borgia and Marie Tudor, the first a good and stirring melodrama, the second a furrage of unveracities of all kinds—moral, historical, dramatic, and the rest; in 1834 came Claude Gueux, which is pure humanitarian sentimentalism, and the Littérature et Philosophie Mélées, a collection of juvenilia in prose, all carefully dated and all as carefully rewritten or revised. Followed in 1835 Angelo, a third melo-

HUGO 823

drama in prose, and the admirable lyrism of Les Chants du Crépuscule; in 1856 La Esmeralda (an opera for Mdlle. Bertin); in 1837, Les Voix Interieures, in which, as in Les Feuilles d'Autonne, the poet's genins of diction is held by some to have found its noblest expression; in 1838, Ruy Blus, after Hornani the most famous of his stage rhapsodies; and in 1840, Les Rayons et les Ombres, yet another collection of brilliant and sonorons verse; after which the prodigious affluence of creativeness to which all those were due appears to have been momentarily exhausted. Certain it is that Hugo published no more until 1843, when he again failed at the Français with that ponderous trilogy of Les Burgraves, surcharged with as it were an Æschylean sentimentalism. His next essay in pure art was not put forth till 1856, the dozen or lifteen years between being very largely given over to the pursuit of polities and the practice of oratory, journalism, and pamphleteering in

prose and verse.

Putting it roughly, Hugo was until 1830 a Royalist, and worshipped Napoleon; and between 1830 and 1848 he was a Napoleonist with a turn for humanitarianism, but more or less resolute in the cause of order and law. In this latter capacity it was that he sat for the city of Paris in the Assemblee Constituante. There he voted now with the Right and now with the Left, so that, when on his election to the Assemble Legislative he threw in his lot with the democratic republicans, the reproach of apostasy was by no means unfounded. It is not clear that he would have been finally content with any change in the condition of things at this time—always excepting such a turn of the wheel as would have brought himself to the top and kept him there as a kind of emperor by the grace of genius and the democracy. But it is plain that he was bitterly dissatisfied with things as they were, even as it is plain that he could neither endure the eminence of Montalembert nor consider with patience and dignity the fact of the popularity of the prince-president. In 1852, after the coup d'état, he withdrew to Jersey, whence he issued his Napoléon le Petit, perhaps the most mannered and the least literary of all his works, and in 1853 Les Châtiments, which is certainly the greatest achievement in the fusion of pure poetry with political and personal satire in all literature. Three years after appeared Les Contemplations, a gathering of poems clegiacal, reflective, and lyrical, remarkable for beanty of expression and compara-tive simplicity of style; and three years after that the wonderful and often bewildering Lègende des Siècles (1859). Still another silence of three years was broken by the publication (in ten languages) of Les Misérables (1862), a panoramic romance of modern life, mannered beyond measure in style and abounding in absurdities and longueurs, but including also not a little of Hugo's sincerest and most touching invention and achievement; and this in its turn was followed by the extraordinary rhapsody called William Shakespeare (1864), and by Les Chan-sons des Rues et des Bois (1865), a book of verses which is at the same time a little gallery of achievements in style; by Les Travalleurs de la Mer, an idyll of passion, adventure, and self-sacrifice; by Le Homme qui Rit, a piece of fiction whose purpose and tenor are intended to be historical, and whose effect is sometimes to overwhelm the reader, often to weary him, and still more often to amuse. Returning to Paris after the Fourth of September, Hugo at once distinguished himself by sun-moning the Germans to withdraw from France and proclaim the German Republic. Some five or six months after he was chosen to represent the Seine, but soon resigned his seat on the ground that one of his speeches was interrupted !

by the Right. He stayed on through the rule of the Commune, and defended the Vendone Column while he could; and then, departing for Brussels, he protested publicly against the action of the Belgian government in respect of the beaten Com-munists, the effects of which proceeding were that minists, the effects of which proceeding were that the populace rose against him, and that he was expelled the kingdom. Again he stood for Paris, but was beaten by a majority of 27,000 on a register of 231,000. In 1872 he published L'Année Terrible, a series of pictures of the war, diatribes against Germany, and cologies of France, which are often eloquent and are sometimes poetry; in 1874 his last romance in prose, the much-debated Quatre-Vingt-Treize; in 1875-76 a complete collection of his speeches and addresses. In 1876 he was made a senator, and published the second part of the Légende; 1877 was the year of the Histoire d'un Crime, which has been fairly enough described as 'the apothcosis of the Special Correspondent,' and of L'Art d'être Grand pire, wherein, with much and of L'Art d'être Grand-pire, wherem, with much charming verse, are good store of conceits and no small amount of what some one has called 'the pedantry of sentimentalism;' 1878 and 1879 enriched us with Le Pape—a piece humanitarian, anti-clerical, and above all theatrical, which they may praise who can—and La Pitié Suprême, the effect of which is much the same, and which—like effect of which is much the same, and which—like L'Ane (1880), and a great deal of Les Quatre Vents de l'Esprit (1881), and Torquemada (1882)—is merely Hugo in decay. His mastery of words remains invariable, his accomplishment is always superb; but all too frequently he produces antithesis under the delusion that he is expressing thesis inder the deutsion that he is expressing ideas, he parades all manner of affectations with the air of one reviewing a Tenth Legion or Old Gnard (so to speak) of the scntiments, he continually mistakes prepostcrousness for grandeur; he falls a prey to any of the eternal unveracities he may chance to encounter; his 'philosophy' is a supersonal difference of a provide and a supersonal district of a provide and a previous provided the second and the mere effect of appetite, and as always his depressing lack of humour is 'not merely zero, but even a frightful minus quantity,' so that he abides in error with a seriousness ridiculous indeed. But genius is always genius, and temperament never ceases from being temperament; and the final impression is one of unsurpassed accomplishment and abounding mental and emotional activity. So that Hugo died the foremost man of letters of his time, and they were few indeed who gradged him the public funeral with which he was dignified, and in which the pauper's hearse that hore him tombwards—(the invention was wholly his own) - was followed by the best and the worst of living France.

Hugo's work is vitiated as an expression of life by the presence of an abounding insincerity in combination with a quality of self-sufficiency so inordinate as scarce to be distinguished now and then from an immense stupidity. In truth he does but seem to create: his personages—Cimourdain, Josiane, Didier, Ursus, Rny Gomez de Silva, Claude Frollo, Lantenac, Lucrèce Borgia, Javert, and Myriel, the very pieuvor of Les Travailleurs de la Mer, are all expressions not of humanity but of Victor Hugo. Yon would believe in them—and in him—if yon could; but yon cannot, for he takes care to make belief impossible. His plays are sometimes well made, are always heavily decorated, are all magnificently written, and have all had their chance of inunortality. But their author is Victor Hugo, and the situations are abnormal, the personages peculiar, the interests remote from experience, and such motive as is developed is too individual and strange to be felt beyond the footlights. Much the same is true of his prose romance; but while the level of style is nothing like so high as in the plays, it has merits—of invention, pathos and

terror, presentation—absent from these, and which made him one of the most popular writers of his epoch. That said, it may be added that to talk of Hugo as either a dramatist or a master of romantic fiction is to beg the question of Hugo's greatness. His prose, as prose, has never the easy, voluptnons, natural eloquence of George Sand's, nor the mordant felicity of Mérimée's, nor the spontaneity and vivacity of Dumas's, nor the terrible yet irresistible persnasiveness of the opening chapters of Musset's Confession d'un Enfant du Siecle. His dramas are only so many lyrical expressions of Hugolatry, the work of the arch-Hugolater. His best and truest title to immortality is his poetry. In truth, the range and the eapacity of his genius in thythm and thyme are unparalleled in the literature of France. It was for Musset to utter the truest note, and to make the invention speak the very language of the heart; it has been for Leconte de Lisle, for Baudelaire, for Cautier to produce impeccable work each after his kind; but assuredly it was for Hugo to accomplish the most gorgeous and the most heroic achievement in the divine art of song. His verse, with its infinite eapacity of violence and calm, sunshine and thunder, apocalyptic fury and grace ineffable, has some-thing of the effect of the multitudinous seas as he saw and described them from his cyric in midchannel. The effect of his alexandrines, with midciannel. The effect of his alexandrines, with their wealth of colour and light and energy, may fairly be paralleled with that of Shakespeare's iambics; while in their purity of form, the sweetness and distinction of their cadences, their richness of rhyme, their magical felicity of expression, his lyrical measures put the Pleiad and all its works to shame. There can be no possible doubt that in many of the relations of life Hugo was a poseur of the first magnitude—that from the first he humbugged his contemporaries with a pertinacity and a success that are only equalled by his faculty of taking himself seriously (so that at last it was a taking himself senously (so that at last it was a moot point whether Hugo was the divinity or the divinity was Hugo)—in which he indulged from the first book to the last. But there can be as little that while essentially me French—a combination, indeed, of Teuton and Celt, and moreover absolutely lacking in sanity—he was a lyrist of the first order, and such a master of words and endences, such an artist in rhythms and rhymes, that he may fairly be said to have found Evench nectors a place fairly be said to have found French poetry a place of brick and stucco, and left it a palace builded of jewels—a palace of the Arabian Nights.

See Victor Huyo raconté par un Témoia de Vie; A. C. Swinburne, Victor Huyo; Gantier, Histoire du Romantisme; Banville, Petit Traité de Poésic Française; Baudelaire, L'Art Romantique; Heine, Dumas (Mes Mémoires), Gustave Planche, Paul de Saint-Victor, and

Sainte-Beuve, passim.

Huguenots (from the Genevese niekname eignenot, Ger. eidgenosse), the name formerly given in France to the adherents of the Reformation, which movement commenced almost simultaneously in France and Germany. One of the most eminent names in the early history of French Protestantism is that of Faicl (q.v.), and one of the first supporters of its cause was Margaret of Valois, queen of Navarre, the sister of Francis I. Subsequently, in the time of Calvin, many of the nobles and middle classes embraced the reformed religion. Francis I., however, opposed it with great severity, and caused many to be burned as heretics. The alliance of Henry II. with the German Protestants gave at first an impulse to the cause of the Reformation, but the aspect of things was again changed when the family of Guise obtained ascendency at court. Under Francis II. a chamber (chambre ardente) was established in each parliament for the punishment of Protestants; and executions, confiscations, and banishments were common in all parts of the kingdom. The Protestants took up arms against the government, choosing Louis I., Prince of Bourbon-Condé, for their leader. retinee of bourbon-conde, for their leatter. On February 1, 1560, in a meeting at Nantes, they resolved to petition the king for freedom of religion and for the removal of the Guises; and in the event of his refusal, to seize the king's person, and proclaim Conde governor-general of the kingdom. But the court, being apprised of the conspiracy, fled from Blois to Amboise, and the Duke of Guise was appointed governor-general. Some bands of Protestants, approaching Amboise with weapons in their hands, were easily defeated and taken; 1200 died by the hand of the executioner. The Edict of Romorantin, in May 1560, took the prosention of heretics out of the hands of the parliament, and gave it into those of the bishops. Whilst the Ginises plotted the death of the Protestant leaders Charles IX. ascended the throne, a prince not yet of age; and the queen-mother, Catharine de Medici (q.v.), having removed the Guises from the helm of the state, was compelled to seek the support of the Protestants against them and their party. In July 1561 appeared an edict which freed the Huguenots from the penalty of death. For the complete termination of strife the court opened a religious conference at Poissy. The chief disputants were the Cardinal of Lorrnine on the one side, and Theodore Beza (q.v.) on the other. The effect of the discussion was to unite and embolden the Protestants, with whom the machinations of the Guises forced Catharine into closer alliance. In 1562 appeared an edict giving noblemen the right of the free exercise of their religion on their own

In March of the same year, a company of Protestants met in a barn at Vassy for religious exercises was attacked, and many of them were massacred by the followers of the Duke of Guise. On this Coulé hastened to Orleans, and called his co-religionists again to his standard; whilst the Guises took possession of the persons of the king and his mother, and proclaimed the Protestants rebels. In September the royal troops took Rouen, and in December a buttle was fought at Drenx, in which, after a hard struggle, the Protestants were defeated. The Duke of Guise marched on Orleans, hut was assassinated in his camp before that city, February 18, 1563. Hereupon the queen-mother hastened to conclude the peace of Amboise, by which the Protestants were allowed the free exercise of their religion, except in certain districts and towns. Catharine, however, formed a close alliance with the Spaniards for the extirpation of heresy, retrenehed the new liberties of the Protestants, and made attempts upon the life of Condé and of the Admiral Coligny (q.v.). These leaders of the Protestant party adopted the resolution of taking possession of the king's person. The court fled to Paris, which Condé invested; but in November 1827. Lette une familie of the Protestant party adopted to Paris, which to the protest of ber 1567 a battle was fought at St Denis between Condé and the Constable Montmorency, in consequence of which Conde fell back into Lorraine; and in March 1568 Catharine concluded peace at Longjuneau. Nevertheless she persecuted the Protestants, of whom 3000 were assassinated or executed. The Protestants having, however, or executed. The Protestants having, however, received assistance in troops from Germany, and in money and artillery from England, began the third religions war. But on March 13, 1569, they were defeated, and Coudé their leader slain, at Jarnac by the royal troops under the Duke of Anjou, afterwards Henry III. Jeanne d'Albret, queen of Navarre, endeavoured to reanimate the Protestants, and set up her son, afterwards Henry IV., as the head of the Protestant cause. Coligny having received further assistance of troops from Germany, laid siege to Poitiers, but was again defeated by the Duke of Anjon at Moncoatour. Fresh reinforcements from England, Switzerland, and Germany enabled Coligny to take Nimes in 1569, and to relieve La Rochelle, whilst Lanoue obtained a victory over the royal troops at Luçon. Cutharine and her son now sought for peace; and a treaty, concluded at St Germain-en-Laye in August 1570, gave to the Protestants an amnesty, the free exercise of their religion everywhere except in Paris, and the posses-

sion of a number of places of security.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery; and by a general massacre of Protestants on St Bartholomew's Day (q.v.) 1572, 30,000 Huguenots were slain within two months in Paris and in the provinces. Although danied of the left by the provinces. though deprived of their leaders, and weakened by the slaughter of great numbers of their best and bravest, the Protestants flew to arms. The Dake of Anjon, after having lost his army before La Rochelle, took advantage of his election to the throne of Poland, and in 1573 concluded a peace by which the Protestants obtained the free exercise of their religion in their places of scennity, Montaulan, Nimes, and La Rocholle. A section of the Roman Catholic nobility, at whose head was the Duke of Alençon, the youngest son of Catharine, from purely political motives united with the Protestants in opposition to the queeu-mother and the Guises. Catharine, therefore, incited her third son, now Henry III., immediately to recommence hostilities against the Protestants. But, contrary to all expectation, the Protestant cause was in the highest degree prosperous during the year 1575. A peace was concluded at Beaulien by which the Protestants were freed from all restrictions in the exercise of their religion, and obtained eight new places of security. The Duke of Guise originated a Catholic association, called the Holy Leagne, at the head of which the king put him-self in the Assembly of the States at Blois in 1576, and the sixth religious war legan. Peace was, however, again concluded by the king himself at Bergerae, in 1577, on the former conditions; and Catharine, to diminish the power of the Duke of Chise, entered into a private treaty with Henry of Navarre. The terms of peace being violated by the court, Henry I., Prince of Coudé, son of Louis I., commenced the seventh religious war (called the guerre des amoureux) in November 1579; but he and his colleague Henry of Navarre being vanquished, peace was concluded at Fleix, November

There was now a comparatively long interval of repose till 1584, when, by the death of the Duke of Anjon (formerly of Alençon), Henry of Navarre became heir to the throne of France. Herenpon Henry, Duke of Guise, exerted himself for the revival of the League, ontered into an alliance with Spain and the pope for the extirpation of heresy, declared the Cardinal of Bourbon heir to the throne, and hegan hostilities against the Protestants. This war is commonly known as the 'war of the three Henries.' The king soon made terms with Guise, and declared all the privileges of the Protestants to be forfeited. The Protestants, having obtained troops from Germany and money from England, entered on the eighth religions war, Henry of Navarre commanding the Protestant army. The Duke of Guise, in the midst of these troubles, grasped the whole power of the state. But his designs with regard to the throne having become very evident, the king caused him and his brother the cardinal to be assassinated at the Assembly of the States at Blois in September 1588. In less than a year the king was himself assassinated by

a monk named Jacques Clément, and Henry of Navarre succeeded to the throne, and signed the famous Ediet of Nantes (see NANTES) on 13th April 1598.

Under the reign of Henry IV. the Protestants lived in tranquillity. But when, during the minority of Lonis XIII., Mary de' Medici, the queen of Henry IV., assumed the rems of government, the marriage treaties with the Spanish court excited the apprehensions of the Protestants to such a degree that in November 1615 the Prince of Condé set up the standard of rebellion. In spite of the treaty of London (1616), in June 1617 a royal edict commanded the entire suppression at once of the Protestant Church and of political privileges in the province of Bearn; an edict not carried into full effect till 1620. Hostilities again broke out in May 1621. At the head of the Protestants were the two brothers, the Duke of Rohan and the Prince Sonbise. Their canse, however, was feebly maintained; and after the capitulation of Montpellier, 21st October 1622, there followed a general peace, by which the Edict of Nantes was confirmed, but the right of prohibiting the assemblies of the Protestants was assumed on the part of the crown. The court, however, paid little attention to the treaty, and the Protestants again rose in arms. Soublise, with a fleet furnished by the town of La Rochelle, oftener than once defeated the weak royal navy; and Cardinal Richellen (a.v.) in May 1621. At the head of the Protestants were the town of La Rochelle, ortener was the weak royal navy; and Cardinal Richelieu (q.v.) resolved upon the capture of La Rochelle. This he accomplished after a heroic resistance by the inhabitants. The fall of La Rochelle was speedily inhabitants. The fall of La Rochelle was speedily followed by that of Nîmes, Montauban, Castres, and all the other Protestant strongholds. Now left defenceless, and bereft of all political power, the Protestants were entirely dependent on the will of the court, which, however, made no attempt to deprive them of their liberty of conscience. It was Louis XIV, who, at the instigation of Madame de Maintenou and his confessor Lachaise, commenced anew the persecution of the Protestants, gradually deprived them of their canal civil rights, and endeavoured to put down the Protestant Church altogether. Bodies of toops, accompanied by monks, passed through the southern provinces, compelling the inhabitants to renounce their religion, demolishing the places of worship, and religion, demolishing the places of worship, and putting to death the preachers (see Dragonnades). Féncion was conspicuous for his zeal in seeking the conversion of Protestants. Hundreds of thousands fled to Switzerland, the Netherlands, England, and Germany. Many Protestants also made an insincere profession of Roman Catholicism. On 23d October 1685 Louis at last revoked the Edict of Nantes. Hereupon began a new flight, followed by a still more fearful persecution of the Protestants. Their marriages were declared null; their children deprived of the right of inheritance, and forcibly shut up in convents; their preachers indiscriminately put to death. From the vicinity of Nimes, where they had always been very numerous, thousands betook themselves to the mountains of the Cévennes, and continued the version of their religious in course. exercise of their religion in secret. Amongst these and the mountaineers of the Cevennes a remarkable fanatical enthusiasm displayed itself, and, under the name of Camisards (q.v.), they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The War of the Cevennes, or Camisard War, was not terminated till 1706, the suppression of the local with the best of the control of the local with the local with the control of the local with the control of the local with th rebellion being attended with circumstances of great cruelty. France lost in twenty years more than half a million of her most active, enterprising, and industrions citizens; and, notwithstanding all the persecutions, about two millions continued to adhere to the Protestant religion.

The partial repose which the Protestants enjoyed for more than ten years was attended by a revival of their worship, especially in Provence and Dauphine. In 1724, therefore, Louis XV., at the instigation of the Jesuits, issued a severe edict against them. The spirit of the age, however, now began to be opposed to persecution. An edict of 1752 declared marriages and baptisms by Protestant ministers to be null, and required the repetition of them by the Roman Catholic clergy. But when, upon this, many began again to flee from their country, the disgust of the Roman Catholics themselves was so much excited that the court recalled the edict. Montesquien successfully advocated the cause of toleration; Voltaire did much to promote it by his exposure of the judicial murder of John Calas (q.v.). At last, hy an edict in 1787, which indeed was not registered by the parliament till 1789, Louis XVI. declared the Protestant marriages and baptisms to be valid, and restored to the Protestants equal civil rights, except that they might not be advanced to public offices and dignities. Even in 1789 a proposal for the complete emancipation of the Protestants was rejected by the National Assembly, which, however, admitted Protestants, and even Protestant preachers, as members without objection; and in 1790 it passed a decree for the restitution of all the moperates of non-Catholies confisented since the time of Louis XIV. The Code Napoleon gave Protestants in France equal civil and political rights with Roman Catholies. The charter granted by the Bourbans acknowledged the freedom of Protestant worship, and the state pledged itself for the maintenance of the pastors; yet under the government of the Restoration the privileges of Protestants were in many ways circumscribed. After the revolution of July 1830 the Reformed Charter of France proclaimed universal freedom of conscience and of worship, which principle has been maintained in subsequent changes. Protestants were no longer subjected to many exceptional hardships, and in various important in-stances were protected by Napoleon III. from the arbitrary exercise of power attempted by illiberal the recognised Protestant Church—in which are included both Reformed and Lutherans, and of which the pastors receive small salaries from the state (see FRANCE)—was not till 1872 permitted to hold synods or general assemblies or to proselytise. At a synod held in that year the conservative party in the church, in spite of some opposition, carried their proposal that the church, which had long been without a formally binding creed, should adout an evangelical confession. French should adopt an evangelical confession. French Protestants now number 700,000 approximately, with 1400 places of worship and 950 ministers,

The first Hugnenot churches in England date from the 16th century, as also the intraduction of the Hugnenot industries, such as the woollen, worsted, and mapery trades, silk-weaving, tapestry, dyeing, glass-making, puttery, and paper-making. Under Charles II, the Savoy in London was granted to the Hugnenots as a place of worship, a fashionable West-end church, in which, as a taken of 'conformity,' the Common Prayer-book was read in French. From 1685 onwards thousands and thousands of Hugnenots found their way to England, and gave William of Orange the support of their military talent, political interest, and financial resources. The planting of Protestantism in Ireland was greatly due to the services of the Huguenots Schomberg and Ravigny. Under Queen Anne there were thirty Huguenot churches in London alone. Towards the close of the century more than half had disappeared through the rapid absorption of the Huguenot families in the Angli-

can Church, and their rise to the first ranks in the gentry of England. Members of the Saurin family sat among the bishops, the son of Peter Allix became dean of Ely, the son of Casaubon was rector of Ickham, the families of Chenevix and Trench gave archbishops to Dublin and Tuam, and that of Romaine elergymen to London. Cavalier and Ligonier served under the British flag, Romilly adorned English law, the Martineans shine in English letters; the Beauforts, Boileaus, Bosanquets, Boundillons, Cazenoves, De Crespignys, De Villiers, Dn Canes, Gossets, Layards, Millais are only a few instances taken at random ont of several hundred family names of Huguenot origin.

See Rulhière, Érlaireissements Historiques sur les Causes de la Révocation de l'Édit des Nantes (1788); Félice, Hist. des Protestants en France (1851); Hang, La France Protestante (1859); new ed. 1883); the works of Capefigue (1838) and Agnesse (1882); Smiles, The Huguenots in England (1867); Bared, Ruse of the Huguenots (1880), and his Huguenot Emigration to America (New York, 2 vols. 1885); E. L. Poole, The Huguenots of the Dispersion (1880); Bulletin de l'Histoire du Protestantisme Français; Transactions and publications of the Huguenot Society of London, established in 1885. See also the articles France, Marot, Herrie IV., &c.

Hnia-bird (Interedocha acutivostris), a remarkable New Zealand sturling, now restricted to a few wooded and mountainous regions. The plumage is black, except on the white tips of the tail feathers; there is a wattle at the corner of the mouth; the bill of the female is strikingly different from that of her mate, being long, much enryed, and pliant, instead of straight and strong as in the male. The difference is so marked that the two sexes were formerly referred to distinct species. In digging grubs out of wood the two kinds of hills supplement one another. The birds, which are becoming rapidly rare, seem to submit readily to captivity.

Hull, or Kingston-on-Hull, an important and flourishing English river-port, a parliamentary and numicipal borough and county of itself, is situated in the East Riding of Yorkshire, in a low, level plain on the north bank of the Humber, here 2 miles wide, and here joined by the Hull, 42 miles ESE, of York and 173 N. of London. Of churches the most notable are Holy Trinity, Decorated and Perpendicular in style, with a central tower 140 feet high; and St Mary's Lowgate (1333), one-half of which was removed to make room for the mansionhonse of Henry VIII., who stayed here in 1540. Both were restored by Sir G. G. Scott. All Saints' Church (1869), from designs of Street, is a good example of a brick church. The most important educational establishments are Hull and East The most important Riding College; the Hull grammar-school (1486), where Andrew Marvell was educated; and Trinity House School (1716), where a large number of boys receive a nantical education; to which may be added the Literary and Philosophical Society, the Royal Institution, the Hull Church Institute, Young People's Christian Institution, Literary Club, College of Chemistry, Mechanics' Institute, the School of Art. An equestrian statue (1734) of William III, stands in the market place, and in Junction Street is a column (1834) surmounted by a statue of Wilherforce, who was a native, as also was Mason the poet. Among many other benevolent establishments, the Trinity House, instituted in 1369, but rebuilt in 1753, for the relief of decayed seamen, and the Charterhouse (rebuilt 1645), an endowed institution for the poor, are the most worthy of note. There are three prettily laid out worthy of note. There are three prettily laid out public parks. A town-hall, Italian Remaissance in style, was opened in 1866, as also was a new exchange. There are also a spacious gaol (1869), a new post-office (1877), the Theatre Royal (1873),

the dock-office (1871), public baths (1850), a new market hall (1887), and the James Reckitt Free

Library (1889).

The docks and basins, comprising an area of npwards of 200 acres, have been constructed since The Victoria Dock (1850-64) covers 20 acres, exclusive of two large timber ponds and tidal basins which contain an area of about 9 acres; it partly occupies the site of an old citadel with a battery of twenty-one gans, which till 1864 commanded the entrance of Hull Roads and the Humber. The Albert Dock (241 acres) was opened in 1869; and the Alexandra Dock (40 acres) in 1883, on the same day as the Hull and Barnsley Railway. Hull was one of the first ports in England to engage in the whale-fishery, an enterprise which has been abandoned; but its fisheries for edible fish employ, in conjunction with those of Grimsby, large fleets of boats, attended by steam anxiliaries. Hull is a principal steam packet station, and ocean-steamers ply regularly to many of the principal ports of Belgium, Holland, Denmark, Russia, Germany, and Scandinavia. Its home trade is also very extensive. It is the great outlet for the woollen and cotton goods of the midland counties, with which it has direct communication, by means of railway, river, or canal. It is the chief entrepôt for German and Scandinavian oversea trade. There is also regular steam navian oversea trade. There is also regular steam communication with New York and Boston; and an Australian trade and a very important trade with India have been inaugurated. Hull ranks third among British ports, the average yearly value of its imports exceeding £20,000,000, of its exports £16,000,000. From its geographical position it is confidently believed that, even were the interior of the combine applied to five a few the control of the combine applied. of the country canalised as far as Leeds, the port at the month of the Humber would continue to maintain the position of third entrepot of the kingdom. Shipbuilding yards are in operation; and, in addition to iron ships, important iron-clads have been built here for British and several foreign governments. The chief manufactures are those principally to which a flourishing port gives rise, as ropes, canvas, chain, chain cables, machinery, &c. Many mills of various kinds are carried on, as well as chemical factories, tanneries, and sugar-refineries. Seed-crushing for oil is also an important staple industry, in which a large amount of capital is invested. Constituted the free borough of Kingston on Hull by Edward I, in 1299, the town owed much to its great merchant house, the De la Poles, whose head, Michael, in 1385 was created Earl of Suffolk. In 1642 the refusal of its governor, Sir John Hotham, to admit Charles within its walls marked the outbreak of the Civil War, during which Hull was twice besieged by the royalists. It was made the scat of a suffragan hishop in 1534, and again in 1883. Since 1885 Hull has returned three instead of two members to parliament. Pop. (1851) \$4,690; (1881) 165,690; (1889) 208,017.

See local works by Gent (1735; new ed. 1869), Frost (1827), Symons (1862), Sheahan (1864), and Tindall Wildridge (1888); also Freeman's English Towns (1883).

Hull, the chief town of Ottawa county, Quebec, is on the Ottawa River, opposite Ottawa city, with which it is connected by a suspension bridge. It has several mills, and manufactures axes, matches, and wooden wares. Pop. (1881) 6890.

Hull, WILLIAM, an American general, was born at Derby, Connecticut, in 1753, rought with distinction in the war of independence, and was governor of Michigan territory from 1805 to 1812. When the second war with Britain was hurriedly entered into, the government sent him at the head of an ill-found army of 1500 men to defend Detroit;

there he was left without supplies, shut in by British and Indians, and ultimately compelled to surrender. The government needed a scapegoat, and Hull was tried by court martial and scapegorita be shut. The sentence, however, was never carried out, and he died on his farm at Newton, Massachusetts, in 1825.

His nephew, ISAAC HULL, naval officer, was born at Derby, Connecticut, 9th March 1773, became a cabin-boy at fourteen, rose to the command of a ship in the West Indian trade, and in 1798 entered the newly-established American navy as a fourthlientenant. He was appointed to the Constitution frigate, which he commanded as captain from 1806. Hull was an able seaman, and in July 1812 his skill in sailing his ship enabled him to escape from an English squadron, after a pursuit of three days and nights. On August 19 of the same year he captured the British frigate Guerriere, forty-four gun-, after a close action of thirty minutes; the Constitution losing former killed and wounded, the Guerriere seventy-nine. The Guerriere was so injured that she had to be burned; while Hull's frigate e-caped with such slight damage as to gain for her the name of 'Old Iron-ides.' Hall received a medal from congress, swords of honour, and the reedom of several cities. He afterwards communded squadrons in the Mediterranean and Pacific, retired in 1841, and died in Philadelphia, 13th February 1843. See the Life by General James Grant Wilson (New York, 1889).

Hullah, John Pyke, the pioneer of music for the people, was born at Worcester, 27th June 1813. He studied at the Royal Academy of Music, and in 1836 composed The Village Coquette to Charles Dickens's libretto. In 1840 he began popular singing-classes in Exeter Hall, London, in which, during a course of twenty years' teaching, he trained thousands to use their voice in singing. He was for several years professor of Vocal Music in King's College, and taught at other schools and colleges in College, and taught at other schools and colleges in the metropolis; and from 1874 to 1882 was appointed inspector of training-schools for the United King-dom. Hullah, who followed a modification of Wilhem's system, had little sympathy with recent developments of modern music, and opposed the 'Tonic Sol-fa' method. He published amongst other works a History of Modern Music (1862) and The Third Period of Musical History (1865). Of his songs, 'The Three Fishers' and 'The Storm' attained wide popularity. He died in London, 21st February 1884. See the Life by his wife (1886).

Hulsean Lectures, &c. The Rev. John Hulse, born at Middlewich, Cheshire, in 1708, educated at St John's College, Cambridge, and died in 1789, bequeathed his property to the university, for the founding of two divinity scholarships in St John's College, the Hulsean Prize, the ollice of Christian Advocate (in 1860 changed into the Hulsean Professorship of Divinity), and that of Hulsean Lecturer or Christian Preacher. The lecturer, appointed annually, must deliver at least four lectures before the university, although the number required was originally twenty, afterwards reduced to eight, and since 1860 to four. The subjects are 'the Evidence for Revealed Religion; the Truth and Excellence of Christianity; Prophecies and Miracles; Direct or Collateral Proofs of the Christian Religion, especially the Collateral Arguments; the most difficult Texts or Obscure Parts of Holy Scripture.' Among the lecturers have been Trench, Christopher Wordsworth, Ellicott, Dean Howson, Farrar, Dr E. A. Abbott, and Bishop Boyd Carpenter.

Humane Society, The, was formed in 1774 by Dr Hawes and Dr Cogan and thirty-two others,

in London, for the purpose of resuscitating those who had been immersed in water and were apparently drowned. At the present time it distributes rewards, consisting of medals, clasps, testimonials, and sums of money, to those who save or attempt to save life from drowning. Also 'all cases of exceptional bravery in resening or attempting to rescue persons from asphyvia in mines, wells, blast-furnaces, or in sewers where foul gas may endanger life, are recognisable by the society.' It likewise gives prizes for swimning to the pupils of public schools and of training sinps. Boats and boatmen



Medal of the Royal Humane Society (actual size 11 mch diameter)

are kept on the Serpentine in Hyde Park for the purpose of watching over the bathers who resort thither. And during the skating season experienced icemon are sent to the various waters in and around London to help in case of accidents. The society is supported by bequests and private subscriptions. Since 1873 the Stanhope gold medal has been awarded 'to the case exhibiting greatest gallantry during the year.' In 1889 more than five

hundred rewards were distributed, one hundred more than in any other year since the foundation of the society. The figure shows the medal of the society. Another reverse is used when it is presented to persons who have risked their lives to save others, but without success; the inscription is 'VITA PERICULO EXPOSITA DONO DEDIT SOCIETAS REGIA HUMANA.' See Annual Report of the Royal Humane Society (4 Trafalgar Square, W.C.).

Humanists (Lat. litera humaniores, 'polite letters'—whence the fitle Humanity for the professorship of Latin in Scottish universities; Ital. innanista), the maine assumed at the revival of learning by those who looked upon the cultivation of classical literature as the most valuable instinment of education, in opposition to those who ching to the ancient methods of the Scholastics (q.v.). In then modes of thought also the tendency of the humanists was to exalt l'aganism at the expense of Christianity. In the 18th century the name became a word of reproach for those who showed a blind zeal for the classics as the sole educational subject, opposing the Philanthropists, who asserted the value of mathematics, science, modern languages, and history. The maine is often given to the foremost representatives of classical learning from the time of the Renaissance (q.v.) onwards, such as Erasnus, Sir Thomas More, Uhich von Hutten, George Buchanan, &c.

Humanitarians, a name assigned to anti-Trinitarians, who regard Christ as a mere man, and refuse to ascribe to him any supernatural character, whether of origin or of nature (see UNI-TRICARTANS). The name Humanitarian is also sometimes applied to the disciples of St Smon, and in general to those who look to the perfectibility of human nature as their great monal and social dogma; also to those who, from over-phlantlnopy, object to severe measures, such as capital punishment, &c. For the religion of Humanity, see Positivism.

END OF YOL. V.